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Red Flags Property Inspection

2018

PowerPoint
Presentation

Red Flags Property Inspection Guide

- What Is a Red Flag?
  - A Red Flag is a visual sign or indication of a defect in a structure or property. Examples of Red Flags are:
    - cracks in exterior and interior walls
    - vertical and horizontal cracks in a foundation
    - sloping and sagging floors
    - doors that leak, stick, or do not close properly
    - doors that have been shaved and are not a complete rectangle
    - windows that leak, stick, or do not close properly

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- What Is a Red Flag?
  - A Red Flag is a visual sign or indication of a defect in a structure or property. Examples of Red Flags are:
    - plumbing fixtures that do not function as intended
    - mechanical equipment that does not function as intended
    - buckled or slanted retaining walls

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What Is a Safety Hazard?

- A safety hazard is anything that could cause an injury. Personal injury caused by a safety hazard (such as a cut or fracture) is usually obvious. A house needs to be as safe as possible to prevent injuries.
- Some examples of safety hazards include:
  - Slipping/tripping hazards (such as electrical cords across floors or constantly wet floors)
  - Exposed (bare) electrical wires, conduit pulled apart or hanging loosely
  - Fire and explosion hazards (excessive amounts of gasoline in a detached or attached garage)

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What Is a Safety Hazard?

- Some examples of safety hazards include:
  - Pressure systems (such as old steam boilers, radiators, and pipes)
  - Any item or material not properly attached to a surface that can fall from a height, shift, or roll from its original location and cause bodily harm or death

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- Why are Red Flags Present in a House?
  - Movement of a house is usually differential in nature.
  - Most property defects develop over a period of years; the age of the structure should be kept in mind during the inspection process.
  - Older structures (10 years or older) will show much more evidence of problems if problems exist, especially if maintenance has been neglected.
  - Very young structures (new to 3 years old) pose a special problem.

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- Why are Red Flags Present in a House?
  - Serious problems may be undetectable while a house is still young.
  - If symptoms of distress are seen in a new house, it is a sign of a possible severe and fast-moving defects.
  - Rule-of-thumb: Red Flags are much more worrisome if found in a new house and a lack of Red Flags is much more impressive in an old house.

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- Soils:
  - There are 4 classifications of soil. They are:
    - gravel
    - sand
    - silt
    - clay
  - Most soils are a mixture of two or more of these soils and this mixture of soils is called loam.
  - Soil classification depends on the ingredient that has the most influence on the soil's behavior.
  - For example, gravel and sand are coarse-grained soils.
  - Of all these different soil types, expansive clay soils are problematic because they expand as they absorb water.

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- Most Common Conditions that Cause Red Flags:
  - Shifting or expanding soils
  - Freezing and thawing soils
  - Leaking roof, windows, and doors
  - Sink holes, settling land fill, slow-moving landslides
  - Improper drainage
  - Lack of proper maintenance

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- Who to Contact in Regard to Red Flags:
  - Structural Engineer
  - Roofing Professional
  - Foundation Professional
  - Mechanical (HVAC) Professional
  - City and County Government Officials
  - The Environmental Protection Agency (EPA)

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- Cracks in Structures, Driveways, Sidewalks, Patios, Basement Floors, and Various Foundation Types:
  - Check all properties for cracks in their asphalt or concrete driveways, sidewalks, patios, decks, slabs, or garage floors.
  - A few hairline cracks are no cause for worry, but cracks that are wide enough to insert a number 2 pencil tip into can indicate a defect.
  - If one side of a crack in a walking surface is raised enough to trip over, it is a safety hazard and an indication of uneven ground movement.
  - Look for cracks between the patio's edge and the house's foundation.
  - Check to see if the sidewalks, driveways, patios, decks, garage floors, or slabs have open voids.

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- Cracks in Structures, Driveways, Sidewalks, Patios, Basement Floors, and Various Foundation Types:
  - There are several different types of cracks you will encounter while inspecting a foundation. These are:
    - **Hairline Cracks**
    - **Open Cracks**
    - **Cracks with Vertical Slippage**
    - **Horizontal Cracks**

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- Cracks in Structures, Driveways, Sidewalks, Patios, Basement Floors, and Various Foundation Types:
  - Foundation Cracks
    - Hairline Cracks:
      - During the normal curing process of concrete, random hairline cracks will appear.
      - Hairline cracks are random thin cracks that look like pencil lines drawn on the surface and they do not completely penetrate the surface. There are no openings between the edges and they usually do not indicate serious problems.

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- Cracks in Structures, Driveways, Sidewalks, Patios, Basement Floors, and Various Foundation Types:
  - Foundation Cracks
    - Open Cracks:
      - The width of open cracks should be estimated. Is it wider than the width of lead in a number 2 pencil?
      - Report all open cracks that are wider than the lead in a number 2 pencil, or when one end of the crack is wider than the other. These are Red Flags.

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- Foundation Cracks:
  - Cracks with Vertical Slippage:
    - Vertical slipping may be very serious.
    - It means that the concrete on one side of the crack has moved down.
  - Horizontal Cracks:
    - Horizontal cracking of concrete foundations is almost always accompanied by severe vertical cracking.
    - Cold joints in concrete can appear to be horizontal cracks and although visually unsightly, they are not normally considered a serious structural defect.

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- Foundation Cracks:
  - Horizontal Cracks:
    - Cold joints occur during construction when all the concrete is not poured at the same time and the previous pouring solidifies prior to the placement of more concrete.

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- Foundation cracks fall into several categories:
  - Vertical and diagonal cracks are more serious.
  - Horizontal cracks are usually not serious, but you should note their location, width, and length.
  - Cracks in foundations are common.
  - The corners of some foundations have a similar crack on both sides of the corner, or the corner is missing altogether. These are called "corner pops" and are not a structural problem.
  - Cracks in a foundation may indicate a severe problem or merely a normal condition of random cracking.

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- Proper Drainage, Building Ventilation, Hillside Instability, and Fills:
  - Proper drainage of roof and yard areas is important because water collecting near the house or underneath it can aggravate existing soil problems.
  - Expansive soils, when exposed to a large volume of water, will swell to their maximum and then shrink dramatically when dried again.
  - Many foundations cannot tolerate these maximum shrinking and swelling cycles.
  - When a homeowner allows these conditions to exist, cracking and settlement will result.

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- Proper Drainage, Building Ventilation, Hillside Instability, and Fills:
  - Loose fill-soil will sag and settle causing damage if they are not kept well-drained.
  - If water pools right next to a foundation, it can easily seep under the house, causing voids under the foundation, basement flooding, wood rot, damage to heat ducts, and swelling of wood floors.

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- Building Ventilation:
  - The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement or cellar) shall be provided with ventilation openings through foundation walls or exterior walls.
  - The minimum net area of ventilation openings shall not be less than 1 sq. ft. for each 150 sq. ft. of under-floor space area.
  - The ventilation openings will be within 3 feet of each corner of the building.
  - Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow.

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- Building Ventilation:
  - Ventilating openings shall be provided with a corrosion-resistant wire mesh that has 1/8-inch minimum and ¼-inch maximum openings.
  - The ventilation portals must be screened to prevent the entrance of rodents and insects.
  - The integrity of the ventilation portals should be inspected and any damage reported.

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- Hillside Instability, Landsliding:
  - A hillside is stable if it is likely to remain in its present form, at rest, without sliding or eroding.
  - It is difficult for even an expert to predict the future stability of a hillside.
  - A visual inspection can be made for signs of past instability, erosion, or soil that crumbles slowly and falls away.

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- Hillside Instability, Landsliding:
- Retaining Walls:
  - Retaining walls are used to hold soil that would otherwise slide down.
  - They are built of wood, rock, concrete, etc.
  - Most retaining walls should last 100 years or longer.
  - Untreated wood or Douglas fir walls only last 10 to 20 years before they decay due to wood rot.
  - A retaining wall is not supposed to move or crack.
  - It should have a drainage system to keep water from building up behind the wall and pushing it forward.

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- Fills:
  - Most hillside house sites and many level house sites have varying amounts of fill-soil used to fill low areas of a site, which creates a flat pad on which to build.
  - Fill may have been used on only a few small dips and gullies; or, if the site was originally quite steep, a great deal of fill may have been used.
  - It is difficult to determine by visual inspection alone whether fills exist and whether the fill was constructed correctly.
  - Improper fills may make their presence known by the damage they cause.

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- Roof, Window and Flashing Leakage:
  - A leaking roof is a major problem and is often very expensive to repair, especially if the roof needs to be completely replaced.
  - If there are any signs of roof leakage, a licensed general contractor or roofing contractor should be called in to do an inspection.
  - Window or flashing leakage in a house constitutes a serious problem and can cause significant damage if not detected.
  - The most common sign of past leakage is wood and wall staining.

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- MOLD:
  - Molds produce tiny spores to reproduce.
  - Mold spores waft through the indoor and outdoor air continually.
  - Mold spores land on a damp spot indoors. They may begin growing and digesting whatever they land on in order to survive.
  - There are molds that can grow on wood, paper, carpet, and foods.
  - When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or unaddressed.

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- MOLD:
  - There is no practical way to eliminate all mold and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.
- You need to always remember!
  - **"The key to mold control is moisture control."**

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- Hazardous Hand & Guard Rails:
  - Handrails should be provided on at least one side of each continuous run of treads or flight with 4 or more steps.
  - Handrail height shall be not less than 34 inches and not more than 38 inches.
  - Porches, balconies, or raised floor surfaces located more than 30 inches above the floor or grade below shall have guards not less than 36 inches in height.
  - Porches and decks that are enclosed with insect screening shall be provided with guards where the walking surface is located more than 30 inches above the floor or grade below.

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- Hazardous Hand & Guard Rails:
  - Required guards on open sides of stairways, raised floor areas, balconies, and porches shall have intermediate rails or ornamental closures that do not allow passage of a sphere 4 inches or more in diameter.
  - **The reasoning behind this 4-inch separation requirement is for the protection of little children.**

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Hazardous Vegetation:

- Check around the house for trees or bushes that could cause damage.
- These include good-sized trees or bushes less than 5 feet from the side of the house and very large trees up to 15 feet away.
- The roots of large trees and bushes can grow under the foundation, patio, driveway, or sidewalks breaking the concrete with their roots.
- Wherever the end of the tree's branches are is where the roots of the tree are.
- This causes transpiration (the removal of moisture) from under the foundation.

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Hazardous Vegetation:

- Tree branches should never extend over the house's roof unless you have hired a qualified tree surgeon to place a root barrier along the foundation.
- The ideal placement of a tree is 1½ times its mature height away from the house.
- Among the most common hazards are dead or unhealthy trees.
- Dead trees are dangerous because they are unstable and moderate winds can often topple them, causing major damage to structures, not to mention the possibility of injury to the building's occupants.

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- Hazardous Vegetation:
  - Dead or unhealthy trees should be identified, especially those close to habitable structures.
  - Poisonous plants, many of which are volunteer in a house's landscaping, can cause health problems.
  - Some of these are: poison oak, poison sumac, poison ivy, castor bean, and so on.
  - Any of these located near the house should be documented and disclosed.

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- Septic Systems:
  - Whenever a house is not on the city sewer system, this house will usually have 1 of 2 different types of septic systems.
  - The first and most common type is a septic tank with a soil drain field.
  - The second type is an aerator system that has sprinkler heads to disperse the processed wastewater.
  - Indications of a malfunctioning system include visible signs of seepage and a strong sewage smell.
  - A septic system needs to be at least 50 feet from a water well, underground cisterns, stream, lake, pond, sprinkler system, and/or swimming pool.

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- Garage Door Springs:
  - Garage door springs are designed with a wire or cable through the center so that if the spring shatters, pieces do not fly through the air like bullets. A safety concern!
- Swimming Pools and Spas:
  - Check for levelness: Measure the distance from the rim of the pool to the surface of the water.
  - The water should be within ½-inch of the same level all around the pool.

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- Swimming Pools and Spas:
  - The sides and bottom of the pool should be sound and free from cracks.
  - Inspect the decks around the pool for cracks.
  - Be aware of any electrical cables within 22 feet of the surface of the pool or 14 feet any direction of the diving board.
  - All swimming pools or spas are required to have a barrier 48 inches high surrounding them and the barrier shall not allow passage of a 4-inch diameter sphere.

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- Tennis Courts:
  - Tennis courts are usually concrete or asphalt and it is important for the court to be in good condition.
  - Tennis courts should be slightly higher in the center than on the sides so water can drain off. Water should not form puddles on the court.
  - Both asphalt and concrete tennis courts should be inspected for cracks and settlement in the same manner used for driveways.

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- Play Structures:
  - Play structures for children, such as tree houses or elaborate swing systems, either free standing or in trees, can be quite hazardous.
  - If you do not feel comfortable inspecting these structures, refer them to a professional carpenter or structural engineer for closer inspection.

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- Illegal Additions:
  - Illegal additions to houses are a very common problem.
  - If the you notice a specific area of the house that does not appear to be built with the same style or quality as the rest of the house, you should question the owners to see if they are aware of any additions to the house without proper permits.
  - Many additions built without a permit are built by people who are not aware of local building, electrical, plumbing, or mechanical codes.

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- Basements and Crawl Spaces:
  - The same method used for inspecting foundations should be used for inspecting basement walls.
  - Walk along the basement walls no further than five feet away from the foundation using a strong flashlight and note the type, location, and angle of any existing cracks.
  - Be alert for white, powdery deposits along foundations and walls, especially if there are also visible water stains.
  - Look for a "sump pump" in the lowest part of the basement floor.
  - If there is a sump pump, it most likely has been installed as a result of incoming water.

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Wall Cracks:

- Cracks develop in the walls of houses for a number of reasons.
- Wooden framing of the house may dry out and shrink shortly after the house is built.
- Almost every house has a few hairline cracks caused by shrinkage of wood.
- However, differential movement of the structure may occur, caused by foundation movement or structural defects that can cause significant wall cracking.
- When inspecting for cracking, pay particular attention to common crack locations such as the corners of windows, doors and the walls of rooms.

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Wall Cracks:

- Consciously look for cracks behind curtains and on ceilings throughout the house and make written notes of the amount and severity of any cracking observed.
- A significant amount of diagonal cracking, large cracks, or spaces associated with other indications such as sloping floors or sticking windows or doors are a concern.
- Homeowners commonly paint and patch homes for aesthetic reasons prior to selling them.

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- Wall Cracks:
  - However, often they inadvertently conceal or hide defects.
  - The following are usually concealed by the owners: wall cracks, torn and/or puckered drywall tape, wall water stains, sticking doors and windows.
  - Therefore, you should make an effort to identify any possible defects.
  - Often a patched wall area will have a different surface texture from the rest of the wall.
  - The color of the paint may also be slightly different.
  - Sometimes wallpaper is used to redecorate walls, so cracks can be concealed.
  - Some of the time the cracks can be felt with the fingertips.

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- Sloping Floors:
  - In a typical house, floors are sufficiently level and any sloping can be determined only by precise measuring.
  - Do floors feel springy? A very springy floor indicates a possible problem with the interior floor structure.
  - You should look for cracks in all tile and marble floors.
  - A continuous vertical crack that covers 3 sections of marble or tile in the floor is always a Red Flag.

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- Sloping Floors:
  - There are two simple tests that reveal the levelness of a floor.
    - These test are:
      - The Shuffle Walk
      - The Ball-Rolling Test
  - When performing these tests, pay particular attention to the possibility that the outer walls of the house may have settled relative to the interior walls.

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- Sloping Floors:
  - **Test #1 - Shuffle Walk:** Walk across the floor quickly without lifting your feet. Keep the front part of your shoes on the floor. Move toward the outside walls of the house. Walking this way makes you much more sensitive to slope. If the floor is not level, you will experience a feeling of going downhill.
  - **Test #2 - Ball-Rolling:** Use a smooth ball, such as a racquetball. First, place it on the hard floor near the middle of the room and see if it rolls. Then try placing the ball in several spots around the room. If the ball rolls to the same spot repeatedly, that spot must be lower than the rest of the floor. Any evidence of sloping should be noted as a Red Flag.

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- **Sticking Doors and Windows:**
  - There are two things to look for when inspecting doors and windows:
    - 1. sticking when you open or close them
    - 2. uneven spaces between doors and their frames
  - These two symptoms usually mean movement of the walls and floors have changed the shape of the window or doorframe.
  - Always open and close every door and window in the house.

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- **Sticking Doors and Windows:**
  - When you are inspecting a door, look at the spaces at the top and bottom.
  - The door should resemble a long, narrow rectangle.
  - Always look for signs that the door has been sawed or sanded to make it fit the crooked frame.

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- Hazardous Stairs:
  - Stair Treads and Risers:
  - TREAD:
    - The tread is the horizontal part of the stair and the tread is measured from the back to the front edge of the stair.
    - The minimum tread depth shall be 10 inches.
    - Winder treads shall have a minimum tread depth of 10 inches measured as above at a point 12 inches from the side where the treads are narrower.

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- Hazardous Stairs:
  - RISER:
    - The riser is the vertical member between 2 treads.
    - The maximum riser height shall be 7¾ inches.
  - As you walk up or down a flight of stairs you will fall into a certain rhythm and you will notice if one of the stair risers is off.

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- Fireplaces:
  - There are several types of fireplaces.
    - These are the most common:
      - Freestanding
      - Open-front
      - Open-two-sided
      - Open-three-sided
      - Open-four-sided
      - Prefabricated

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- Fireplaces:
  - Most fireplace structures are much heavier than the house structure (on a pounds-per-square-foot basis) and may settle, even if the house does not.
  - Settling may cause a few hairline cracks where the edge of the fireplace meets the wall, but these usually are not serious.
  - Be aware of any combustible material within 12 inches of the firebox.

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- Sagging Beams:
  - If portions of a building are improperly sized, the wrong building materials are used, or proper construction methods are not followed, distress to a house can occur.
  - Sagging beams are obvious during a visual inspection.
  - Sagging beams can be easily detected especially if they are so much lower in the middle that the unevenness can be seen with the naked eye.
  - In milder cases, there may be cracks where the beam connects to the framing of the house.

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- Major Mechanical Systems:
- **Electrical System:**
  - Check for loose, damaged, and/or malfunctioning receptacles and wall switches.
  - Look for burn or scorch marks.
  - Extension cords underneath carpets or stapled along baseboards are hazardous and illegal.

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- Major Mechanical Systems:
  - **Plumbing System:**
    - Flush the toilet to make sure it is in good working condition.
    - Turn on all water taps.
    - Do they drip when turned off?
    - Is the hot on the left and the cold on the right?
    - Does the water pressure decrease when you turn on more than one faucet?
    - If the water source is a private well, have the nearest water district test water samples for safety.

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- Major Mechanical Systems:
  - **Heating System:**
    - Locate the thermostat and set the control to heat. Increase the setting to 10 degrees higher than the present temperature reading on the thermostat.
    - The furnace should ignite and start to pump warm air into the room.
    - Move the switch from heat to off.
    - Wait approximately 20 minutes then return to the thermostat and move the control to cool.

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- Major Mechanical Systems:
  - **Air Conditioning:**
    - Decrease the setting 15 degrees below the temperature reading on the thermostat.
    - The air conditioning unit should start pumping cooler air into the room.
    - **You should not test the air conditioning system if the outside temperature is below 60 degrees. This could cause damage to the compressor.**

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- Glass:
  - Large windowpanes, windows next to doors, sliding glass doors, other doors with glass, shower doors, and mirrors are all subject to human impact and pose a potential safety hazard if broken.
  - All glass elements of a house located within 18 inches of the floor are to be of safety/tempered glass.
  - Tempered glass is 2 to 4 times stronger than ordinary glass.
  - Tempered glass will shatter into pebbles instead of breaking into slivers.

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- Glass:
  - The words *safety glass* or *tempered glass* with a monogram is etched on all panes of safety glass.
  - In today's world it is not always easy to see these etchings. If you cannot make sure, refer this to a glass professional for verification.

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- Smoke Detectors:
  - The U.S. is a world leader in death from house fires.
  - Smoke detectors can reduce the risk of someone dying in a house fire by at least 50%.
  - This is true only if the smoke detectors are in working order.
  - An estimated one of every four houses are equipped with smoke detectors that do not work properly.
- Types of Smoke Detectors:
  - Ionization
  - Photoelectric

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- Smoke Detectors:
  - Common Reasons Smoke Detectors May Not Work
    - Batteries are dead or missing.
    - Vents are clogged with dirt, dust, or grease.
    - Sensing chamber is infested with small insects.

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- Smoke Detectors:
  - Proper Testing of a Smoke Detector
    - The "test button test" is not a true test of a smoke detector.
    - If a smoke detector's vents are clogged with dust, dirt, grease, or insects, smoke will not activate the alarm; however, pressing the test button will usually result in the alarm sounding.
    - The best way to test a smoke detector is to use an aerosol product that has been tested and approved by a recognized testing facility such as Underwriters Labs.
    - By doing this simple test, you can find out if your detector is in one of the 16 million houses in America estimated to have faulty smoke detectors.

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- Smoke Detectors:
  - Replacement of Batteries in Smoke Detectors
    - The batteries in a smoke detector should be changed no less than once a year.
    - The best way to remember this is to change your batteries when you set your clocks forward or back.
  - Expected Life of a Smoke Detector
    - All smoke detectors that are 10 years old or older should be replaced!

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- Smoke Detectors:
  - Expected Life of a Smoke Detector
    - These units have gone through millions of testing cycles checking the immediate surroundings for smoke.
    - Even a smoke detector powered with household current and with a battery back-up needs to be replaced after 10 years.

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- Hazardous Materials:
  - Hazardous materials are a problem that can adversely and/or dramatically affect property values.
  - Every state has passed disclosure laws that instituted stricter storage and cleanup regulations for toxic waste.
  - All of us need to understand that there are hundreds of "hazardous materials" in our houses.
  - Some homeowners will unknowingly dump these harmful products onto their property.
  - When these hazardous materials are dumped onto our land instead of being disposed of properly, they eventually create problems with the land and then create problems in our water systems.

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- Hazardous Materials:
  - There are four major classifications of hazardous materials: Corrosive, Toxic, Reactive, and Ignitable.
    - A corrosive material will slowly dissolve or wear away gradually.
    - Corrosive material is a chemical compound that is safely contained in one type of container, usually metal, but if it is placed in a different type of container it will eat through or dissolve that container.
    - A toxic material almost always has a poison identification on the bottle usually accompanied with the skull and crossbones symbol.

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- Hazardous Materials:
  - There are four major classifications of hazardous materials: Corrosive, Toxic, Reactive, and Ignitable.
    - A reactive material is one that when in a container by itself is fine, but if you mix this product with another everyday product there is a possibility of toxic gases or an explosion.
    - An ignitable material is very easy to identify, as the container will have an explosive or flammable warning label or sign.

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- Hazardous Materials:
  - Asbestos:
    - Interested homeowners and prospective purchasers can obtain information concerning asbestos from the U.S. Consumer Product Safety Commission (CPSC) and the U.S. Environmental Protection Agency (EPA).
    - Asbestos is a mineral fiber found in rocks.
    - There are several kinds of asbestos fibers, all of which are fire-resistant and not easily destroyed or degraded by natural processes.
    - Asbestos has been shown to cause cancer of the lung and stomach according to studies of workers and others exposed to asbestos.
    - There is no level of exposure to asbestos fibers that experts can assure us is completely safe.

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- Hazardous Materials:
  - Asbestos:
    - Asbestos has been used in a wide variety of products, including household and building materials, such as appliances, ceiling tiles/coverings, wall and pipe coverings, floor tiles, and some roofing materials.
    - Basically, asbestos has been used in products for 4 reasons:
      - 1. To strengthen the product material
      - 2. For thermal insulation within a product
      - 3. For thermal or acoustical insulation or decoration on exposed surfaces
      - 4. For fire protection

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- Hazardous Materials:
  - Asbestos:
    - Until the **1970s**, many types of building products and their insulation materials used in houses contained asbestos.
    - Asbestos was banned in **1977**.

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- Hazardous Materials:
  - Some asbestos products to look for and where they are used in and around houses:
    - **Vinyl Floor Tiles and Vinyl Sheet Flooring**
    - **Patching Compounds and Textured Paint**
    - **Ceilings**
    - **Steam Pipes, Boilers, and Furnace Ducts**
    - **Resilient Floor Tiles**
    - **Cement Sheet, Millboard, and Paper**
    - **Door Gaskets**
    - **Soundproofing, or Decorative Material**

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- Hazardous Materials:
  - Some asbestos products to look for and where they are used in and around houses:
    - **Patching and Joint Compounds for Walls and Ceilings**
    - **Textured Paints**
    - **Asbestos Cement Roofing, Shingles, and Siding**
    - **Artificial Ashes and Embers**

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- Hazardous Materials:
- Toxic Waste:
  - Some toxic wastes can be highly toxic and long-lived.
  - These toxic substances can pollute water supplies that serve an entire community, pollute the ground a community is built on, or even contaminate food if it is grown on polluted soils or irrigated with polluted water.
  - Water quality has become a significant public safety issue.

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- Hazardous Materials:
- Toxic Waste:
  - Water well pollution from industrial sources, soil pollution in toxic dumps near or over which housing developments have been constructed (as in Love Canal, NY), and contamination of communities by floods carrying toxic runoff (as in Times Beach, FL) continually reemphasize the need for communities to take precautions against pollution.

Red Flags Property Inspection Guide

- Hazardous Materials:
- Radon
  - Information regarding radon can be obtained from the U.S. Environmental Protection Agency (EPA).
  - Radon is a naturally occurring radioactive gas.
  - You cannot see it, smell it, or taste it.
  - Radon comes from the natural breakdown (radioactive decay) of uranium.
  - Radon can be found in high concentrations in soils and rocks containing uranium, granite, shale, phosphate, and pitchblende.

Red Flags Property Inspection Guide

- Hazardous Materials:
- Radon
  - Radon may also be found in soils contaminated with certain types of industrial wastes, such as the by-products from uranium or phosphate mining.
  - In outdoor air, radon is diluted to such low concentrations that it does not represent a safety hazard.
  - However, once inside an enclosed space (such as a house) radon can accumulate. Indoor levels depend on a building's construction and the concentration of radon in the underlying soil.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Radon
    - The only known health effect associated with exposure to elevated levels of radon is an increased risk of developing lung cancer.
    - Not everyone exposed to elevated levels of radon will develop lung cancer and the time between exposure and the onset of the disease may be many years.
    - Radon has always been present in the air.
    - Concern about elevated indoor concentrations first arose in the late 1960s when houses were found in the West that had been built with materials contaminated by waste from uranium mines.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Radon
    - Cases of high indoor radon levels resulting from industrial activities have been found in many parts of the country.
    - We have only recently become aware, however, that houses in various parts of the U.S. may have high indoor radon levels caused by natural deposits of uranium in the soil on which they are built.
    - Most houses in this country are not likely to have a radon problem; but relatively few houses do have highly elevated levels.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Radon
    - The dilemma is that, right now, no one knows which houses have a problem and which do not.
    - You may wish to call your state radiation protection office to find out if any high levels have been discovered in your area.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - **How Does Radon Get into a House?**
    - Radon is a gas that can move through small spaces in the soil and rock on which a house is built.
    - Radon can seep into a house through dirt floors, cracks in concrete floors and walls, floor drains, sumps, sump pumps, joints and tiny cracks, or pores in hollow-block walls.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - **How Does Radon Get into a House?**
    - Radon also can enter water within private wells and be released into a house when the water is used.
    - Usually, radon is not a problem with large community water supplies, where it would likely be released into the outside air before the water reaches a house.
    - For more information concerning radon in water, contact your state's radiation protection office.
    - In some unusual situations, radon may be released from the materials used in the construction of a house.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - **How Does Radon Get into a House?**
    - An example: a house that has a large stone fireplace or has a solar heating system in which heat is stored in large beds of stone.
    - In general, however, building materials are not a major source of indoor radon.
    - Since you cannot see or smell radon special equipment is needed to detect it.

Red Flags Property Inspection Guide

- Hazardous Materials:
- Radon
  - The two most popular detectors are the charcoal canister and the alpha track detector.
  - Both of these devices are exposed to the air in your house for a specified period of time and sent to a laboratory for analysis.
  - There are other techniques—requiring operation by trained personnel—that can be used to measure radon levels, but such techniques may be more expensive than the devices mentioned above.

Red Flags Property Inspection Guide

- Hazardous Materials:
- Underground Storage Tanks/Hazardous Waste
  - Pipes, usually 2 to 2½ inches in diameter, that are emerging from the ground and capped or have a 180-degree bend are common as vent pipes for underground fuel and solvent tanks.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Additional Indications of Improperly Disposed of Toxic Wastes:
    - oil spots on the ground or areas that are dark brown to black where vegetation will not grow
    - holes two or three inches in diameter in garage floors set so that fluids can flow into them (sumps are a pit or reservoir serving as a drain or receptacle for liquids)
    - evidence of extensive paint or chemical storage facilities
    - evidence of facilities or equipment indicating mechanical or fabrication work at that location

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Additional Indications of Improperly Disposed of Toxic Wastes:
    - Many states have regulations requiring removal of the tanks if they haven't been used in six months, or some similar time period.
    - Evidence of underground tanks can also trigger investigation into possible contamination.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Underground Storage Tanks/Hazardous Waste
    - This potentially can lead to very expensive problems.
    - **Whoever owns property today must pay for the cleanup—regardless of who was responsible for the contamination.**

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Lead Hazards from Pipes and Paint
    - **What Is Lead Poisoning?**
      - Lead poisoning occurs when the body contains a high concentration of lead.
      - **Lead poisoning can cause paralysis, brain damage, and convulsions**.
      - Children tend to absorb more lead than adults and they are more likely to exhibit hand-to-mouth behavior.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Lead Hazards from Pipes and Paint
    - **Drinking Water**
      - Drinking water can become contaminated as it passes through lead pipes.
      - In the late 1930s lead water pipes were still being used.
      - In 1986 the Safe Drinking Water Act required the use of lead-free solder, pipes, and flux for facilities connected to public water systems.
      - In 1988, Congress banned the use of lead-based solder in plumbing applications in houses and buildings.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Lead Hazards from Pipes and Paint
    - **Lead-Based Paint**
      - The most probable places where lead-based paint will be found in a house are in the bathroom and kitchen walls, woodwork, and window frames.
      - The use of lead paint was prohibited in 1980.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Lead Hazards from Pipes and Paint
    - A visual inspection cannot determine whether a hazard exists. Checking for the presence of lead-based paint requires removing a sample and having it tested by a qualified laboratory.
    - The probability of lead-based paint having been used in a structure is directly related to its age.
    - Studies have shown that lead-based paint was used in two-thirds of houses built prior to 1940 and one-third of houses built from 1940 to 1960.
    - A smaller percentage of houses built between 1960 and 1980 were found to contain lead-based paint.

Red Flags Property Inspection Guide

- Hazardous Materials:
  - Lead Hazards from Pipes and Paint
    - You should be aware that commercial facilities in which metal work, automobile radiator repairs, and soldering activities were carried out are also very likely places for lead contamination.
    - HUD warns that three out of four houses built prior to 1978 have lead-based paint.

Copy of Student Workbook
"Red Flags Property Inspections Guide"

Red Flags
Property Inspection Guide

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Second Edition

Dearborn™
Real Estate Education

President: Roy Lipner
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Associate Publisher: Louise Benzer
Development Editor: Caitlin Ostrow
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Typesetter: Maria Warren
Creative Director: Lucy Jenkins

Published by Dearborn™ Real Estate Education,
a division of Dearborn Financial Publishing, Inc.®
30 South Wacker Drive
Chicago, IL 60606-7481
(312) 836-4400
http://www.dearbornRE.com

Printed in the United States of America.

07 10 9 8 7 6 5 4

Library of Congress Cataloging-in-Publication Data

Prendergast, James C.
Red flags : property inspection guide / James C. Prendergast.-- 2nd ed.
p. cm.
Includes index.
ISBN 0-7931-3200-2
1. Dwellings--Inspection. 2. Building inspection. I. Title: Property inspection guide. II. Title.

TH4817.5.P74 2005

643'.12--dc22

2004028207

contents

preface

In medicine, pain is a symptom of illness or injury. In a house, sloping floors and cracked walls and foundations are visible symptoms of structural distress that point to possible defects or safety hazards. Such symptoms are called *Red Flags.*

A house is usually the most important purchase in anyone's life, and new homeowners who discover significant problems after they have moved in are rightfully indignant. Often, problems cost many thousands of dollars to correct, or they adversely affect a house's resale value, or an unsafe condition may contribute to an injury. In such cases, a buyer often looks for someone to blame and files suit against the seller, usually including the real estate brokers and agents involved in the purchase.

Real estate brokers and agents have always been responsible for faithfully representing the condition of a property without concealing any known defects. The courts and legislatures of various states, notably California, have given brokers and agents the additional duty of inspecting a property for any visible defects (Red Flags) that may affect its value or desirability and disclosing them to prospective buyers. This is a growing trend, and real estate professionals nationwide may one day be required to inspect properties for Red Flags. For the purposes of this course, a Red Flag is defined as a visual sign or indication of a defect in a structure or property.

Some defects can be remedied by a few minutes' work or a few dollars expended, while others can lead to major property devaluation. Particular attention should be paid to Red Flags affecting the basic structural elements of a house: foundations, floors, walls, roofs, detached garages or other buildings, swimming pools and spas, irrigation systems, tennis courts, water wells, and septic systems.

Brokers and agents who understand their state's disclosure laws and learn to comply with them stand a much better chance of avoiding claims.

This book includes detailed house inspection techniques with illustrations and background information on asbestos, radon, lead, and other hazards to homeowners. It is intended to be an effective tool for nonexperts who need a guide to detect Red Flags in residential properties.

About the Authors

James C. Prendergast is a licensed civil engineer, geologist, and engineering geologist. He earned his BS in geology from the University of California, Riverside, and an MS in civil engineering—with a specialty in geotechnical engineering—at San Jose State University in California.

Mr. Prendergast has been active in the geotechnical field since 1968. In 1976 he founded the consulting firm JCP Geologists, Inc., in the San Francisco Bay area. His firm has worked closely with real estate professionals, providing disclosure

information on geologic hazard zones, as required by city, county, and state laws and the National Flood Insurance Program (NFIP).

In addition, the firm of JCP Geologists, Inc., provides a number of different products to the real estate profession in California, including reports on geologic hazards, environmental hazards reports, "Red Flag" property inspections, and home inspections.

Lynn P. Cushwa is a licensed professional inspector whose company operates in and around the Houston, Texas, area. Following a 30-plus-year career in the telecommunications industry, Lynn decided to retire from telecommunications to begin a new career in the real estate inspection business. Lynn is an active member of the National Association of Certified Home Inspectors (NACHI), the American Society of Construction Analysts (ASCA), and the Professional Inspectors Coalition (PIC).

Acknowledgments

This edition was created with the help of valuable reviews by

- Cory Friedman, Bellman Group
- Susan Geschwender, Randall School of Real Estate
- Bob Klingensmith, Southern Choice Real Estate Academy
- Sam Martin, *www.samthetutor.com*
- Stephen Ruback, ITA—Leonard Hawes

International Residential Code® Information

There are many references in this book to the *International Residential Code®* (IRC), which is published by the International Code Council (ICC). The IRC is used in 43 states and Washington, D.C. It is a compilation of many codes developed by ICC to be compatible with its *International Building Code®*. Visit *www.iccsafe.org*.

International Building Code® Information

Internationally, code officials recognize the need for a modern, up-to-date building code addressing the design and installation of building systems through requirements emphasizing performance. The *International Building Code®*, 2003 edition, is designed to meet these needs through model code regulations that safeguard the public health and safety in all communities, large and small.

This comprehensive building code establishes minimum regulations for building systems using prescriptive and performance-related provisions. It is founded on broad-based principles that make possible the use of new materials and new building designs. The 2003 edition is fully compatible with all the International Codes ("I-Codes") published by the International Code Council, including the ICC *Electrical Code, International Energy Conservation Code, International Existing Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code,* ICC *Performance Code, International Plumbing Code, International Private Sewage Disposal Code, International Property Maintenance Code, International Residential Code, International Urban-Wildland Interface Code,* and *International Zoning Code.*

The *International Building Code* provisions provide many benefits, among which is a model code development process that offers an international forum for building professionals to discuss performance and prescriptive code requirements. This forum provides an excellent arena to debate proposed revisions. This model code also encourages international consistency in the application of provisions.

chapter one

1 Red Flags: What Are They and What Causes Them?

learning objectives

Upon completing this chapter, you will

- understand the meaning of the term *Red Flag*.
- know what a safety hazard is.
- know why Red Flags are present in a house.
- have a better understanding of soils, Mother Nature's effects on soils, and what their effects are on a house.
- be aware of the most common conditions that cause Red Flags.
- know whom to contact for advice in various Red Flag situations.

Key Terms

expansive soils	fill	loam
differential settlement	frost line	

Distressed Structures

What is a distressed structure and how do you identify one? What should homeowners, brokers, and agents do about them?

A structure can be damaged or distressed in a short period of time as a result of floods, tornadoes, hurricanes, or earthquakes. More often, however, damage develops over many years and is caused by one or many of the following:

- Leaking roofs, windows, and doors
- Settling fill, shifting or expanding soils

- Freezing or thawing ground
- Slow-moving landslides

If a house's entire foundation moved evenly up or down one or two inches like a houseboat rising and falling on a tide, damage—if any—would be minimal. However, the structure of a house is complex, and so is its interaction with the soil. When a foundation moves, it moves unevenly; one specific area may settle an inch while the rest of the house remains stable.

Unstable foundations are a major cause of structural distress. The **differential settlement** of a house is the uneven downward movement of the foundation structure, usually caused by varying soil or loading conditions. The results of this settlement are cracks and distortions of the foundation. This differential settlement creates pressure buildup, which concentrates at the corners of doors, windows, and rooms and at other places where structural members meet within walls. If the pressure is greater than the strength of the structure, then weak, rigid parts will break and move.

Differential settlement of a certain portion of a building also can be caused by structural problems that could be related to the original design of the structure or to the quality of its construction. In general, observed Red Flags that indicate distress to a structure are very similar regardless of their underlying causes.

Coupled with poorly designed structural elements, poor or improper drainage, and loose fill, "geologic processes" like landslides or freezing ground can shift a structure's foundation unevenly. These processes go through cycles of activity and their effects build up over a period of years.

Patching cracks in walls, repairing torn drywall tape, shaving doors, and releveling floors with jacks are only temporary fixes to any structural problem. Differential settlement will continue until a repair scheme corrects the basic cause of the problem or designs around the problem. If a seller patches and paints a distressed house before selling it without repairing the cause of the problem, the buyer of an apparently undamaged house that starts to crack and settle after title is transferred may have no alternative but to file suit against the seller and all parties involved in the transaction.

Because most serious distress is caused by foundation or soil problems, repair can be expensive, but it is in the interest of an owner or buyer of a distressed house to have it repaired properly to prevent further damage. In some cases, the only way to deliver a sound house to the buyer is to correct the damage at the seller's expense.

A structural engineer with expertise in distressed structures should be consulted. The structural engineer will document the damage and determine the probable cause, do an in-depth study that often includes drilling for soil samples, and develop a repair scheme for which a contractor will provide an estimate. Structural engineers can often recommend specialty contractors experienced in fixing such distressed houses.

Homeowners' insurance policies sometimes cover damaged structures. If an insurance company denies coverage, an attorney should be consulted. Contractors and developers may also be liable for improper construction. Again, experi-

enced structural engineers usually know attorneys who are experts in this type of litigation.

What Is a Red Flag?

A Red Flag is a visible sign or indication of a defect in a structure or property. Certain visual signs in themselves are not clear indications of defects, but if observed in multiple numbers, especially in the same approximate location, they probably point to the existence of a Red Flag condition. Safety hazards, like other defects, are Red Flags and must be disclosed.

A safety hazard is anything that could cause an injury. Injury caused by a safety hazard is usually obvious, such as a cut or fracture. A house needs to be as safe as possible to prevent injuries. Some examples of safety hazards include

- slipping/tripping hazards (such as electrical cords across floors or constantly wet floors);
- exposed (bare) electrical wires, conduit pulled apart and/or hanging loosely;
- fire and explosion hazards (excessive amounts of gasoline in a detached or attached garage);
- pressure system hazards (such as poorly maintained, old steam boilers, radiators, and pipes);
- any item or material not properly attached to a surface that can fall from a height, shift, or roll from its original location and cause bodily harm or even death.

Because most property defects develop over a period of years, the age of the structure should be kept in mind during the inspection process. The broker or agent must evaluate the information obtained during the inspection relative to the age of the structure. Older structures (ten years or older) will show much more evidence of problems if they exist, especially if maintenance has been neglected.

Very young structures (brand-new to three years old) pose a special problem. Not enough time has passed for the ongoing effects of a defect, if one exists, to cause visible damage. Therefore, serious problems may be undetectable while a house is still young. If symptoms of distress are seen in a new house, it is possibly a sign of a severe and fast-moving defect.

Rule of thumb: Red Flags are much more worrisome if found in a new house, and a lack of Red Flags is much more impressive in an old house.

Research and Planning

Most brokers and agents are quite familiar with title reports, which usually include information on easements, property line distances, directions, and so on. City or county engineering departments usually keep copies of the original and any subsequent building or construction permits issued. In addition, copies of soil reports, engineering calculations, geologic reports, and other documents are also kept in city or county files.

When researching a property, always obtain all documents possible from the seller and review the title report or preliminary title report. If there is an indica-

tion of an illegal or nonconforming addition, research city or county files for building permits. Any discrepancy or omission of information that comes to your attention during the research should be well-documented for disclosure purposes.

A properly conducted Red Flags inspection consists of three parts:

1. The exterior of the building and the surrounding grounds
2. The interior of the building and accessory structures, including retaining walls, detached garages, storage sheds, pools, and tennis courts
3. Environmental or safety hazards.

Begin by inspecting the outside of the building and the surrounding grounds. Stop at the curb and take a panoramic look at the house and surrounding property with a critical eye. Note the slope of the land and general appearance of the house. Are the roof's lines straight, and is the roof covering (wood shingles, tile, composition shingles, etc.) in good shape? Check for cracks in sidewalks, driveways, foundations, exterior walls, and the chimney. Be alert for drainage problems (pooling of water), unstable soils (soils being washed away), and unsafe conditions. Then take a close-up view of the surrounding property, including hazardous trees and vegetation. Also make note of a pond or lake in close proximity to a house, or housing subdivision. A pond or lake will make the property look better to a prospective buyer and indicate a natural water level in the area.

Go inside and inspect the interior of the house. Look for problems with floors, doors, windows, walls, stairways, and built-in systems such as the stove, furnace, fireplaces, and storage areas.

Inspect any accessory structures such as a detached garage, storage shed, pool, sauna, tennis court, or guest house. Don't forget to inspect the accessory structures with as much care as the rest of the property, and always inspect for any possible environmental or safety hazards that may be present.

What Are the Causes for Damage in Structures?

This chapter deals with the most common conditions that may cause movement of a house. Such movement is usually differential in nature and causes damage evidenced by cracks in walls/foundations, sloping floors, sticking doors/windows, and so on.

No matter what the underlying cause of distress, the visual symptoms, or Red Flags, are generally the same. The exact source of damage, however, should be confirmed or determined by an expert.

Soils

There are four classifications of soil: gravel, sand, silt, and clay. Most soils are a mixture of two or more of these soils, and this mixture of soils is called **loam**. Thus, the soil classification depends on the ingredient that has the most influence on the soil's behavior. For example, gravel and sand are coarse-grained soils.

Of all these different soil types, expansive clay soils are problematic because they expand as they absorb water. A soil engineer rates the potential change of volume in a soil as its Plasticity Index (PI). The higher the PI rating of the soil, the greater its shrink-to-swell ratio.

Expansive Soils

Expansive soils are a common problem in California, Texas, other southwestern states, and various other areas throughout the country. Expansive soils are composed mostly of clay. The three types of clay soils that cause foundation problems are montmorillonite, illite, and kaolinite. When exposed to water, expansive soils will absorb the water and swell; in dry conditions, they shrink. This swelling and shrinking can exert great force and can easily move a relatively light structure such as a house. For example, montmorillonite clay can expand 10 to 15 times its size. This expansion will exert 3 to 6 tons of pressure per square foot, and this amount of pressure can easily move a house that weighs 300 to 400 pounds per square foot.

If a new house is to be built on expansive soil, the soil type should be taken into consideration when the foundation is designed. Otherwise, the house is likely to suffer damage from differential settlement, especially in climates where a very dry season alternates with a wet season.

Expansive soils do not usually shrink and swell uniformly. In the Southwest, the first winter rains following the long dry summer will start to saturate the soil around the perimeter of a house's foundation, but the water may not wet the soil under the house. As a result, the outer walls of the building tend to rise up as the soil swells, while the inside portions remain stationary. This differential settlement causes stress between different parts of the house, which often results in significant damage.

Expansive soils are usually black, dark brown, or dark red. When wet, they have a gooey texture and easily stick to the soles of shoes. When dry, they shrink and cracks appear on the ground and often form a hexagonal pattern, like the bottom of a dried-up pond. If soil is black, soft, and sticky during the wet season, or if cracks appear on the ground in the dry season, the soil is probably expansive.

Fills

Fill is soil that has been moved and placed artificially. Fills are most common in hillside developments, building tracts on level ground, and those adjacent to bays, lakes, rivers, and marshes.

If soils are placed and compacted according to correct engineering criteria, they form a very dense material that is often nearly as hard as rock. Such fills are commonly used for earthen dams, canals, and building pads for structures. A well-engineered and properly constructed fill is a good product and becomes an integral part of the foundation of a structure. Loose or "nonengineered" fills are poor products and are a major cause of structural damage.

Poor fills settle when they get wet or are subject to loading (as by the weight of a building). Vibrations, such as those from a nearby railroad, can also cause settling.

Like expansive soils, fills usually do not move uniformly. The deepest, wettest, and loosest portions of the fill settle the most.

Fills are difficult for a layperson to detect. If terracing or unnatural slopes are seen, fills may have been used on the site, and an effort should be made to determine whether they were properly engineered. If a distressed house is built on a fill, the fill is probably at least partly to blame for the damage.

The broker and agent also need to be aware of trash dumps in their area that were covered with dirt to give them the appearance of a "sanitary landfill." A sanitary landfill is a systematic disposal of trash and garbage in which the waste is buried between layers of earth to build up low-lying land. A trash dump settles for years—possibly decades. The only way to ensure a solid foundation in these cases is to drill down to solid ground and pour piers to support the structure.

Freezing Ground

In the northern United States and in Canada, the ground freezes during the winter months. Actually, the soil itself does not freeze; the water held between soil particles freezes. Because water expands when it freezes and shrinks when it thaws, if structures built in frigid areas are not designed to withstand the pressure of freezing ground, their foundations may be subject to movement and damage. Damage caused by freezing ground is likely to occur within the first few years and will grow more and more severe each winter.

If concrete slabs are improperly constructed, the corners and sides of the concrete can be lifted up by freezing ground, thereby distorting any structure built on the slab. This is why slab-on-grade construction is not common in freezing climates and why basements are common in the northern states. Basements not only provide extra living and storage space; they also extend the house's foundation below the frost line so foundation movement is minimal. The **frost line** is the depth to which frost penetrates the ground, and its depth varies from one portion of the United States to another. The house's footings should always be placed below the frost line to prevent the house from shifting. However, movement can still occur, especially if drainage next to the foundation is poor and water finds its way into the basement.

It is very important that the broker and agent know the depth of the frost line in their area. In Minnesota the frost line is 36 inches; in Texas the frost line is 6 inches. Therefore, a basement built to the depth of 30 inches in Minnesota is a Red Flag.

Collapsing Soils, Sinkholes, and Voids

Sinkholes and voids come in many sizes and types. They are most common in Florida and parts of other southern states. Every year, somewhere in the country, a house is reported to have fallen into a sinkhole. Such catastrophes are comparatively rare, but more slow-moving and less dramatic cases are common. In Florida, for example, much of the soil is composed of carbonate particles that are slowly dissolved by ground and surface water. Small voids and large caverns develop beneath the earth, which can collapse and cause sinkholes.

Buried pipelines are commonly constructed by laying the lines in a trench and filling the trench with sand. If a waterline ruptures in such a trench, especially on a hillside, the sand can be washed away, leaving a void. There would be no evidence of a problem until the surface actually collapsed and a sinkhole occurred. Such an event would not necessarily be quick and dramatic; it could occur slowly, causing gradual settling of the ground surface and any structure built on it.

Silts are particularly common in the northern central states due to geologic processes that have occurred in the past. Such soils have the consistency of flour and are usually very loose. They can collapse when subjected to abundant water, heavy loads, or vibrations. Houses built on this kind of soil usually settle gradually, but unevenly.

Soft clays are naturally deposited in bays, inlets, and lakes throughout the country. Peat deposits are common in the northern states. Both clay and peat will consolidate (compact) in time. Heavy loads, such as a house, can accelerate the rate of consolidation. Thus, if a structure is built on such a deposit, damage can result. Consolidation tends to be a more generalized process than the differential settlement caused by expansive soils and fills. The severity of damage is usually less than with other types of settlement, although similar Red Flag symptoms can be found.

Landsliding

Landslides are quite common in the West but can occur anywhere, mostly where steep slopes coupled with weak rock structure are prevalent. Most landslides occur when the ground is saturated with water and are usually slow moving, contrary to public impression.

Landsliding is a specialized field of expertise reserved for engineering geologists and geotechnical engineers. Visual detection of landslides is usually difficult. Distress to a house probably can be observed, but the average real estate broker or agent usually will not be able to determine landsliding as the cause.

Poor Drainage

Proper drainage of surface water near a structure is vital. A broker or agent can stand at the outside walls of the house and tell if the landscaping is sloped away from the house. The top of a slab-on-grade foundation should extend eight inches above the ground level. The appropriate slope away from the house is six inches in ten feet. An exception to this would be when the property line is too close, in which case the proper use of drains and swales is recommended. If drainage is poor, water will pool next to the foundation and can seep under the structure or bleed through basement walls. The structure and its contents may be damaged. In addition, excessive amounts of water can aggravate existing soil conditions such as expansive soils, silts, or unstable fills. In cold climates, soil containing a high amount of water will swell most dramatically when frozen, possibly causing damage to the structure. In most American basements owners must consider some or all of the following alternatives to keep excessive moisture out of their basements.

- A sump pump
- The proper slope away from the house
- A mechanical dehumidification unit

Structural Defects

Structural or construction defects are the underlying cause of distress in many properties. Undersized beams, improper nailing, and improper construction procedures in general cause defects in a structure. Such defects are usually very difficult to isolate. Where evidence of distress is observed and no specific causes can be identified, a structural or construction defect may be the reason. If there is any suspicion that a structural defect exists, a qualified structural engineer should be retained for a detailed inspection.

case study — Case Study 1

Alex and Diana Lyons have just signed the paperwork to purchase their first house. The house is in an area of the United States that is well-known for its expansive soils. Their real estate agent has assured them that the house is in great shape, a terrific buy, and they should not worry about anything because he has conducted a Red Flag inspection of this property.

A few days after the signing of the contract, Diana starts to have buyer's remorse. Alex tells her he will hire a professional inspector to inspect the property and give them some peace of mind. He contacts an inspector and agrees to meet him at the property the next afternoon.

When the Lyonses meet the inspector the next afternoon, he tells them that he performs a "visual only" inspection and does not dismantle any items in the house. Approximately three hours later, the inspector tells the Lyonses there are some minor problems, but nothing that is of major concern. After covering the items that will need to be corrected inside and outside, he asks if they have any questions.

Alex and Diana tell him this is their first purchase and they are worried about almost everything. The inspector tells them the area has expansive soils and they swell and shrink with the wet and dry seasons. The most important thing for them to remember is that they will need to make sure the ground around the house is always kept moist to prevent movement of the house. He recommends placing a soaker hose about 18 inches away from the foundation.

1. The agent, knowing this is the Lyonses' first real estate purchase, should have
   a. spent more time with them explaining the paperwork they were signing.
   b. spent more time explaining the importance of maintaining the soils around the house to prevent foundation damage because the expansive soils shrink and swell depending on the amount of rain in the area.
   c. told them he had completed a Red Flag inspection and there was nothing to worry about.
   d. told them if they had any questions at all while he showed them the house he would answer them to make them feel more at ease.

Discussion question: If the real estate agent had shown the Lyonses a copy of the Red Flag inspection he performed, do you think they would have been as nervous?

case study **Case Study 2**

Larry was performing a Red Flag inspection of a house on a hillside area. When he walked around the outside of the house, he noticed a large, funny-looking indentation in the ground on the north and west sides of the house. He glanced briefly at the indentation and continued with the inspection. Returning to his agency he completed the paperwork for his inspection and left for the day.

The next day Larry is chatting with Bill, an experienced broker at his agency, regarding his Red Flag inspection and tells him this house is in great shape, is sitting on a beautiful hillside, and has a great view. Bill questions Larry about the property's location and asks if he took a good look at all of the property surrounding the house. Larry told Bill there was a large, funny-looking indentation in the yard, but it looked OK to him. Bill asked if he had taken a really good look at this indentation behind the house to make sure there was nothing seriously wrong, as there were many houses in that area that were built on landfill. Larry assured him it was all right because it looked OK from the rear of the house.

2. Considering Bill's concern, what should Larry do?
   a. Nothing, because Bill is a worrywart
   b. Review his paperwork to make sure he mentioned the large, funny-looking indentation
   c. Call a structural engineer and meet him at the house so he can perform a thorough inspection of the indentation and surrounding area
   d. Tell Bill to mind his own business and to stay away from him

Discussion question: Should Bill volunteer to go with Larry back to the house and take a better look at the large, funny-looking indentation in the yard?

Review Questions

1. What is a Red Flag?
   a. Something that is used to stop traffic
   b. A visual sign or indication of a defect in a structure or property
   c. Anything that causes a defect in a house
   d. A visual defect in a house for sale

2. The age of a house must be considered when evaluating Red Flags. A house that is less than four years old is considered "very young." A good rule of thumb to use when evaluating Red Flags and the age of a house is that
   a. Red Flags found in a very young house are not worrisome.
   b. a lack of Red Flags in a very young house is impressive.
   c. there is no correlation between the number of Red Flags and the age of a house.
   d. Red Flags are much more worrisome if found in a young house and the lack of Red Flags is much more impressive in an old house.

3. A proper inspection for Red Flags in a house should consist of three elements: (1) the inspection of the accessory structures to the house; (2) the inspection of the interior of the house; and (3) the inspection of the
   a. roof structure of the house.
   b. exterior walls of the house.
   c. exterior of the house and the surrounding ground.
   d. condition of any other structures on the property.

4. One common condition that causes differential settlement in a house is expansive soils. Expansive soils are composed mostly of
   a. loam.
   b. clay.
   c. gravel.
   d. carbonate particles.

5. A house built on expansive soil without the benefit of a properly engineered foundation design will suffer the greatest damage from differential settlement in a climate where
   a. a very dry season alternates with a wet season.
   b. a very cold season alternates with a very warm season.
   c. the season is wet most of the time.
   d. the season is dry most of the time.

6. Expansive soils can be identified because
   a. they are light in color and are very slippery when wet.
   b. during the wet season they are black, firm, and sticky.
   c. during the dry season they are soft and fluffy in texture.
   d. they are black, soft, and sticky during the wet season, or cracks appear on the ground in the dry season.

7. *Fill soil* is defined as soil that has been excavated in one area and moved and placed artificially in another area. A structure that has been built on a "nonengineered" fill is subject to damage because
   a. the fill may settle when wet.
   b. settlement may occur because of the weight of the structure.
   c. None of the above
   d. Both a and b

8. Freezing is another cause of structural damage to a house. The damage to the house is caused because
   a. the soil freezes.
   b. the water held between the soil particles expands and shrinks during freezing and thawing.
   c. Both a and b
   d. None of the above

9. If drainage of surface water near a structure is not properly engineered, structural damage to a house can result from
   a. insect infestation.
   b. unsanitary conditions.
   c. pooling of water and aggravation of existing soil conditions.
   d. hydraulic pressures.

10. Where evidence of distress in a house is observed and no specific cause can be identified, the distress is usually caused by
   a. landsliding.
   b. sinkholes.
   c. structural defects.
   d. freezing ground.

11. During the wet season in areas with expansive soil, a house with a basement needs
   a. a sump pump.
   b. proper slope away from the house.
   c. a mechanical dehumidification unit.
   d. All of the above

12. A pond or lake in close proximity to a house or housing subdivision will
   a. make the property look better.
   b. indicate a natural water level in the area.
   c. give you an indication that water damage is more prevalent.
   d. Both a and b

13. You would want the top of a slab-on-grade foundation to be
   a. level with the ground.
   b. below the ground.
   c. 5 inches above the ground.
   d. 8 inches above the ground.

14. The four types of soils are
   a. gravel, sand, silt, and clay.
   b. silt, loam, clay, and sand.
   c. gravel, loam, sand, and clay.
   d. clay, loam, gravel, and silt.

15. The proper slope away from a house is
   a. 10 inches in 6 feet.
   b. 8 inches in 6 feet.
   c. 10 inches in 10 feet.
   d. 6 inches in 10 feet.

chapter two

2 Inspecting for Red Flags Outside the Home

learning objectives

Upon completing this chapter, you will

- understand the significance of cracks in structures, driveways, sidewalks, patios, basement floors, and various foundation types.
- know the importance of proper drainage, building ventilation, hillside instability, and fills as well as the Red Flags associated with these factors.
- be aware of the problems arising from roof, window, and flashing leakage and the Red Flags present.
- recognize the importance of proper construction and installation of hand rails and guard rails.
- know the location of the areas in and around a structure that can contain possible defects that cause harmful effects to the inhabitants and the Red Flags associated with these defects.

Key Terms

corner pops	pier-and-beam foundations	retaining walls
creep	post-tension foundations	transpiration

Cracks in Sidewalks, Driveways, and Decks

Most properties have asphalt or concrete driveways, sidewalks, patios, decks, slabs, or garage floors. It is important to check them for cracks and proper drainage.

A few hairline cracks are no cause for worry. However, cracks that are wide enough to insert a pencil tip into can indicate a defect. If one side of a crack in a walking surface is raised enough to trip over, it is a safety hazard and an indication of uneven ground movement. In general, large numbers of cracks, especially wide-open or offset ones, should be considered Red Flags.

Inspect concrete stairways, decks, or patios constructed adjacent to the home's foundation. If they are on the downhill side of the building, the soil underneath them may be creeping down the hill. Look for cracks between the patio's edge and the home's foundation; if significant cracking is observed, a possible Red Flag exists.

If any sidewalks, driveways, patios, decks, garage floors, or slabs have open voids you can easily see under, this is a Red Flag. These voids could be caused by improper drainage, or they were not properly filled when the home was originally constructed.

■ Foundations

Cracks in Foundations

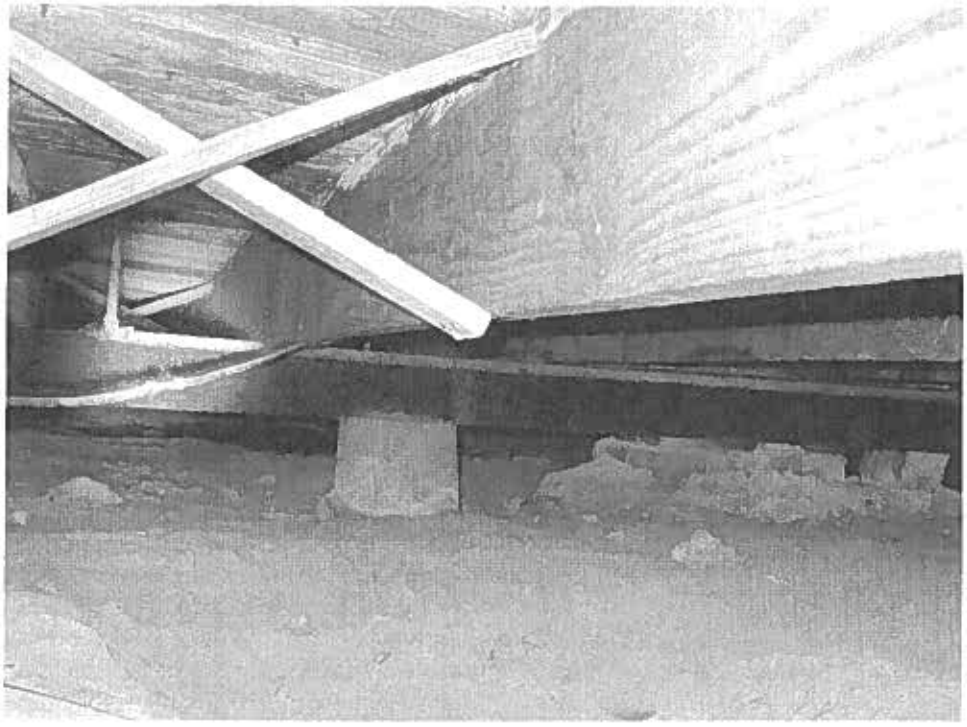
There are several different types of cracks you will encounter while inspecting a foundation.

- *Hairline cracks*: During the normal curing process of concrete, random hairline cracks will appear. Hairline cracks are random thin cracks that look like pencil lines drawn on the surface and do not completely penetrate the surface. There are no openings between the edges. They do not usually indicate serious problems unless a large quantity of hairline cracks are present in one specific area; in that case, they must be considered a possible Red Flag.
- *Open cracks*: The width of open cracks should be estimated. Is it wider than the width of the lead in a No. 2 pencil? If the open crack is wider than the lead in a No. 2 pencil or if one end of the crack is wider than the other, this constitutes a possible Red Flag. Be sure to measure the widest point of the crack.
- *Cracks with vertical slippage*: Vertical slipping may be very serious. It means that the concrete on one side of the crack has moved down. Cracks with vertical slippage are a Red Flag.
- *Horizontal cracks*: Horizontal cracking of concrete foundations is almost always accompanied by severe vertical cracking. However, cold joints in concrete can appear to be horizontal cracks, and although visually unsightly, they are not normally considered a serious structural defect. Cold joints occur during construction when all the concrete is not poured at the same time and the previous pouring solidifies prior to the placement of more concrete.

Foundation cracks fall into several categories. Vertical and diagonal cracks are more serious. Horizontal cracks are usually not serious, but you should note their location, width, and length.

Cracks in foundations are common. The corners of some foundations may have a similar crack on both sides of the corner, or the corner may be missing altogether. These are called **corner pops** and are not a structural problem. Cracks in a foundation may indicate a severe problem, or they may be merely a normal condition of random cracking. A Red Flag exists if there are (1) several severe cracks, (2) one crack showing a suspicious foundation movement, or (3) many hairline cracks, especially if clustered in one place. If a broker or agent is not sure of the seriousness of a foundation crack, he or she should call in a structural engineer or a foundation specialist for assistance.

Figure 2.1 | Pier-and-Beam Foundation



You can see the concrete pier with a beam sitting on top of the pier. As you can see, there is a whitish powder (called *efflorescence*) at the base of the pier. Standing water causes this efflorescence.

Pier-and-Beam Foundations

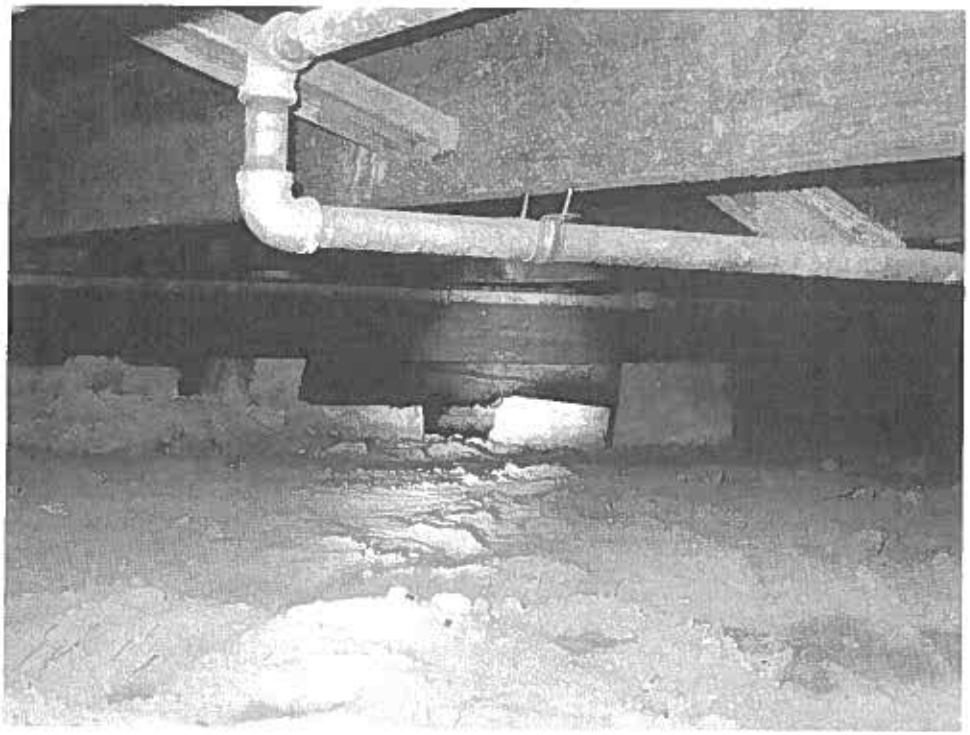
Pier-and-beam foundations are common in older homes built in areas with expanding soils. A *pier* is a vertical support that provides a bearing in the ground; it functions similarly to a column (Figure 2.1). Piers are constructed from concrete, brick, pressure-treated wood, cement block, and wood. A *beam* is a horizontal structural member. These members are made of concrete, timber, stone, iron, or other material and installed horizontally to support loads over an opening.

Pier-and-beam foundations are very difficult to inspect because most of these houses do not have easy and/or adequate access to view the underside of the house. Most older houses have an opening that is usually 12 inches by 12 inches and too small for easy access. If you are able to view under the house, look for standing water, leaning piers, piers not touching their supports, and plumbing lying on the ground or leaking (Figure 2.2). If you see any of these situations, it is a Red Flag. If a home has a pier-and-beam foundation, walk around the outside of the home and look for cracks or other evidence of movement in the exterior walls.

Post-Tension Foundations

Post-tension foundations are common in newer homes located in areas with expansive soils. Post-tension foundations have cables in the concrete that are slowly tightened over a period of days after the concrete has set. These cables are spaced on four-foot centers, and their ends must be covered with material

Figure 2.2 | Improperly Attached Plumbing



As you can see, the plumbing is not properly attached to the floor joist. This is a Red Flag.

that will protect them from the elements. If the ends are not covered, this is a Red Flag (Figures 2.3 and 2.4).

Slab-on-Grade Foundations

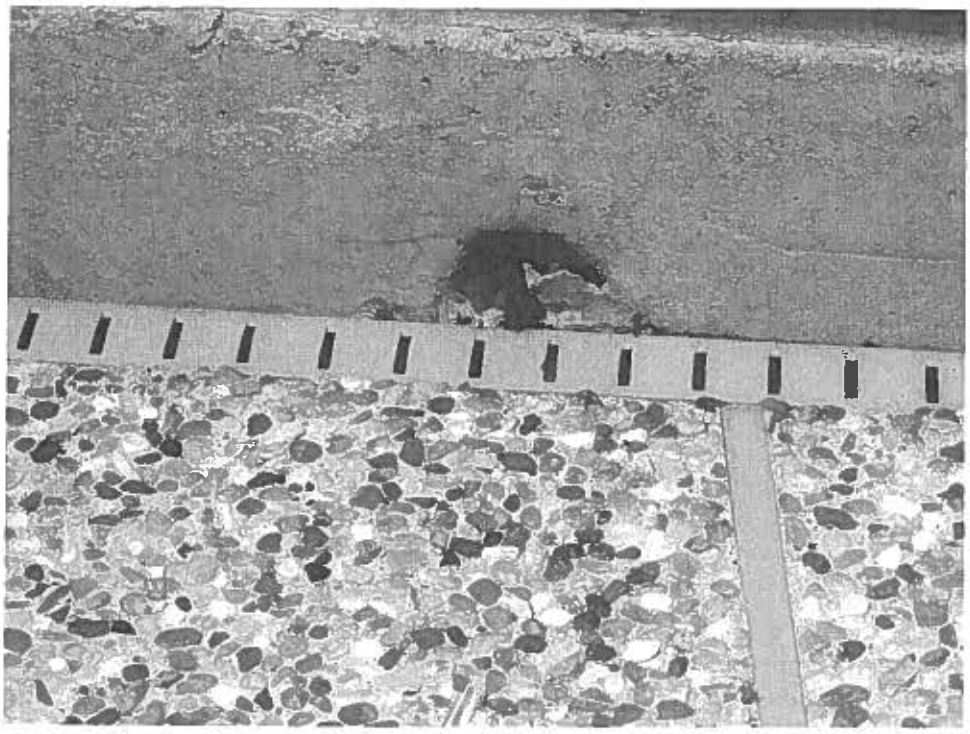
To inspect an ordinary slab-on-grade foundation, walk along the outside of the building not more than five feet away from the foundation and look for cracks.

■ Visually Distorted Structures

Structures that have been affected by foundation movement or structural underdesign will shift and move. The shifting can cause walls to move and to be visually out of line. Garage doors or front and side doorframes can be deformed to the extent that the doors do not fit correctly or stick and bind. Look for wall bulges, especially near the ground surface. Also look for cracking of the walls of the structure, particularly at the corners of windows and doors. Be sure to check for distorted doorframes.

Minor or random hairline cracks have several possible causes and are usually not serious. Such cracking normally would not be a Red Flag. However, significant bulging of walls, drywall tape torn and/or puckered where the wall meets the ceiling, out-of-square doorframes, sticking windows and/or doors that do not shut properly, shimmed and/or shaved doors, and abundant cracking as well as cracking showing either vertical or horizontal movements are Red Flags.

Figure 2.3 | Exposed Post-Tension Cable End



This is an exposed post-tension cable end and a Red Flag.

Drainage

Proper drainage of roof and yard areas is important because water collecting near the home or underneath it can aggravate existing soil problems. Expansive soils, when exposed to a large volume of water, will swell to their maximum and then shrink dramatically when dried again. Many foundations cannot tolerate these maximum shrinking and swelling cycles. When a homeowner allows these conditions to exist, cracking and settlement will result. Loose fill soils will sag and settle, causing damage if they are not kept well drained.

If water pools right next to a foundation, it can easily seep under the home, causing voids under the foundation, basement flooding, wood rot, damage to heat ducts, and swelling of wood floors.

Inspecting for Poor Drainage

Imagine it is raining as you inspect the drainage systems; visualize water flowing through the system. Imagine where this water will end its journey.

Be alert for the following points during your Red Flag inspection:

- All water from the roof should be transported away from the structure, usually through gutters and downspouts. Often closed pipes from the roof lead out to the driveway or the street, which keeps water from pooling next to the house.

Figure 2.4 | Properly Covered Post-Tension Cable End

This is an example of a properly covered post-tension cable end.

- Downspouts that empty next to the foundation or into planter boxes adjoining the home should be considered a Red Flag.
- "The grade away from foundation walls shall fall a minimum of six inches within the first ten feet. ***Exception:*** Where lot lines, walls, slopes, or other physical barriers prohibit six inches within the first ten feet, drains or swales shall be provided to ensure drainage away from the structure" [IRC R401.3]. Ground sloping toward the house is a Red Flag.
- Look for low spots adjacent to structures where ponds of water could form. A pool of water lying against the foundation of a house is a sign of poor drainage and is a Red Flag.

In general, good drainage exists if no water is allowed to pool or flow next to the house's foundation.

Figure 2.5 | Water Should Drain Away from Foundation

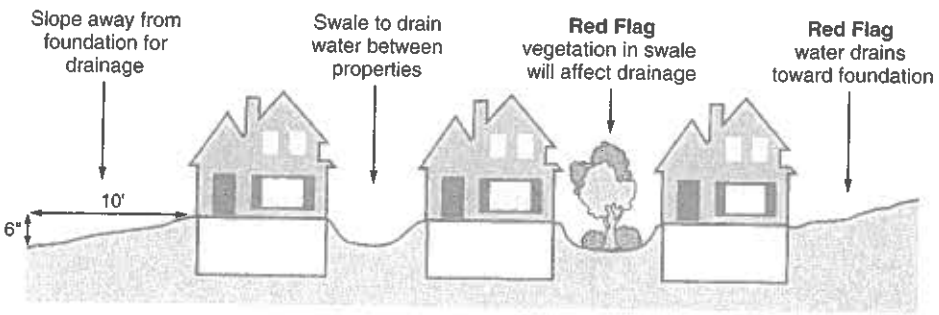
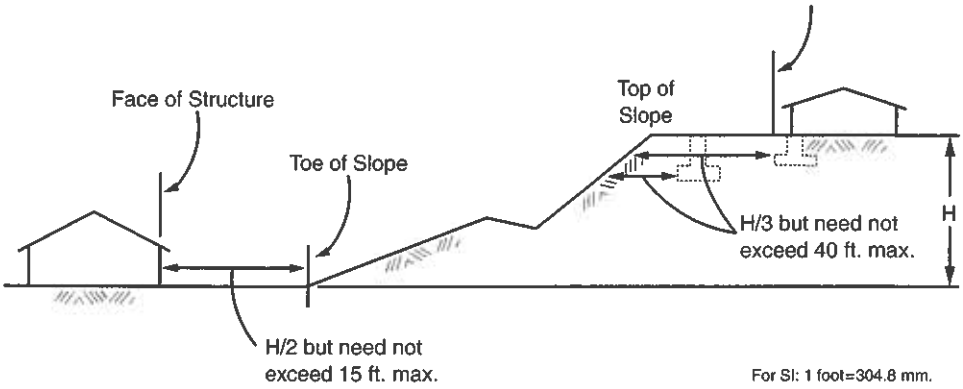


Figure 2.6 | Foundation Clearance from Slopes



Source: *International Residential Code for One- and Two-Family Dwellings 2003.* Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.

Building Ventilation

"The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement or cellar) shall be provided with ventilation openings through foundation walls or exterior walls. The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet of under-floor space area. The ventilation openings shall be within 3 feet of each corner of the building" [IRC R408.1].

"Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilating openings shall be provided with a corrosion-resistant wire mesh with ⅛-inch minimum and ¼-inch maximum openings" [IRC R806.1]. The ventilation portals must be screened to prevent the entrance of rodents and insects. The integrity of the ventilation portals should be inspected and any damage reported.

Hillside Instability, Landsliding

A hillside is stable if it is likely to remain in its present form, at rest, without sliding or eroding. The average real estate broker or agent does not have the expertise to recognize warning signs of most landslides. It is difficult even for an expert to predict the future stability of a hillside. However, an inspection can be made for signs of past instability, erosion, or soil that crumbles slowly and falls away.

"The placement of buildings and structures on or adjacent to slopes steeper than one vertical unit in three horizontal units, that is, the distance from the footing to the top of the slope shall be three times the height of the slope, but not to exceed 40 feet" [IRC R403.1.7]. (See Figure 2.6.)

"In general, buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion, and shallow failures" [IRC R403.1.7.1].

Landslides (mass movement of soil and rock) move at various speeds. Some move very slowly and may slide only a few inches before stopping. If a home is built on an active landslide, differential movement of the structure may have occurred. This often causes foundation cracks, wall cracks, window cracks, and sloping floors.

Plastic sheets covering areas of a hillside may indicate a Red Flag. Bowl-shaped depressions on a hillside or soil that crumbles slowly and falls away may also indicate past instability.

Small-scale landslides often are repaired with retaining walls. Usually several walls are built, like steps going up the slope. If there are several retaining walls on a property, ask the homeowners if they know why the walls were built.

Retaining Walls

Retaining walls are used to hold soil that would otherwise slide down. They are built of wood, rock, concrete, and so forth. Most retaining walls should last 100 years or longer. However, untreated wood or Douglas fir walls last only 10 to 20 years before they decay due to wood rot. A retaining wall is not supposed to move or crack. It should have a drainage system to keep water from building up behind the wall and pushing it forward.

Real estate professionals can use a three-part inspection procedure to check for Red Flags:

1. Stand up against the wall at one end. Look down the length of the wall to see if the top of the wall is leaning away from the hillside. Do this at each end of the retaining wall.
2. Walk along the length of the retaining wall, staying no farther than five feet away. Look for sections of the wall that are protruding past other connecting points and cracks, especially those that show movement.
3. Check for proper drainage. A drainage system may consist of holes in the lower portion of the wall ("weep holes") or spaces between boards of wood. Signs of poor drainage are large water stains or collections of fuzzy crystals (whitish powder) on the front of the wall. Any evidence of improper drainage or the lack of drainage relative to the retaining walls is a Red Flag.

Any severe cracking or tilting of a retaining wall indicates possible failure and is considered a Red Flag.

Fills

Most hillside home sites as well as many level home sites have varying amounts of fill (soil used to fill low areas of a site), which creates a flat pad on which to build. Fill may have been used on only a few small dips and gullies; if the site was originally quite steep, a great deal of fill may have been used.

It is difficult to determine by visual inspection alone whether fills exist and whether the fill was constructed correctly. However, improper fills may make their presence known by the damage they cause.

Fills on the downhill edges of driveways, patios, and other slabs often move down the hill and away from the house, unfortunately taking any asphalt or concrete along with them. This movement is called **creep**. The effect on asphalt driveways tends to be a series of cracks parallel to the driveway's

edge. Minor amounts of creep are to be expected in hillside areas, but large or wide cracks in driveways, patios, and walkways can indicate a serious problem and must be considered a Red Flag.

Fills underneath the house can settle, causing foundation cracks, wall cracks and/or separation, sticking doors and windows, and improperly closing doors and windows.

Roof, Window, and Flashing Leakage

A leaking roof is a major problem and is often very expensive to repair, especially if the roof needs to be completely replaced. If there are any signs of roof leakage, a licensed general contractor or roofing contractor should be called in to do an inspection.

Look for the following Red Flags involving roofs:

- Green moss or other growth signifies a possible moisture or wood rot problem.
- If the home has a cedar shake, wood shingle, or composition shingle roof, look for missing shingles. If the shingles are curling up and separating, the roof may be old—have the roof inspected by a professional.
- Deteriorated flashing, which is the metal underneath the edge of the roof and in the valleys of the roof.
- On composition tile roofs, erosion of mineral coating.
- On tar and gravel roofs, blisters and erosion of gravel.
- Holes and curls in cedar shakes or wood shingles.
- Water stains and/or wet areas in attics, above and around the tops of windows, down the side of a wall, above the fireplace mantel, and on ceilings indicate that roof leakage has been in progress for some time or that flashing has been improperly installed or sealed.
- Recently painted areas on the ceiling or around windows. If such areas have recently been painted over, there may be water stains or patched cracks underneath.
- A black mold-like substance on the attic insulation.
- Tree branches lying on the roof will cause roof damage.

Window or flashing leakage in a home constitutes a serious problem and can cause significant damage if not detected. The most common sign of past leakage is wood and wall staining. Any evidence of roof, window, or flashing leakage is a Red Flag.

Mold

Molds produce tiny spores to reproduce. Mold spores waft through the indoor and outdoor air continually. When mold spores land on a damp spot indoors, they may begin growing and digesting whatever they are growing on in order to survive. There are molds that can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or unaddressed. There is no practical way to eliminate all mold and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.

The key to mold control is moisture control. It is important to dry water-damaged areas and items within 24 to 48 hours from the time damage occurs to prevent mold growth. If mold is a problem in your home, clean up the mold and get rid of the excess water or moisture. Fix leaky plumbing or other sources of water. Wash mold off hard surfaces with detergent and water and dry completely. Absorbent materials (such as ceiling tiles and carpet) that become moldy may have to be replaced.

WEB LINKS

@

For further information about mold, visit.*www.epa.gov/mold/* and *www.epa.gov/mold/moldresources.html.*

Hand and Guard Rails

Handrails should be provided on at least one side of each continuous run of treads or flight of stairs with four or more steps. Handrail height shall be not less than 34 inches and not more than 38 inches.

Porches, balconies, or raised floor surfaces located more than 30 inches above the floor or grade below shall have guards not less than 36 inches in height.

Porches and decks that are enclosed with insect screening should be provided with guards when the walking surface is located more than 30 inches above the floor or grade below.

Required guards on open sides of stairways, raised floor areas, balconies, and porches must have intermediate rails or ornamental closures that do not allow passage of a sphere four inches or more in diameter. The reasoning behind this four-inch separation requirement is for the protection of little children, to prevent a small child's head from slipping through the opening.

If any of the steps, handrails, or guardrails are broken or missing, this is a Red Flag. If the openings in the required guards are larger than four inches, this is also a Red Flag.

Vegetation-Related Hazards

Check around the house for trees or bushes that could cause damage. These include good-sized trees or bushes less than 5 feet from the side of the house and very large trees up to 15 feet away. The roots of large trees and bushes can grow under the foundation, patio, driveway, or sidewalks, breaking the concrete with their roots. The agent or broker should always make note of a tree's branches extending over a roof. The end of the tree's branches indicate where the roots of the tree are below. This causes **transpiration** (the removal of moisture) from under the foundation. Tree branches should never extend over the house's roof unless you have hired a qualified tree surgeon to place a root barrier along the foundation. The ideal placement of a tree is 1½ times its mature height away from the house.

Among the most common hazards are dead or unhealthy trees. Dead trees are dangerous because they are unstable, and moderate winds can often topple them, causing major damage to structures, not to mention the possibility of injury to the building's occupants. Dead or unhealthy trees should be identified, especially those close to habitable structures.

Poisonous plants—many of which are common in some areas—can cause health problems. Poison oak, poison sumac, poison ivy, castor bean, mulberry bushes, and so on, located near the house should be documented and disclosed.

Septic Systems

Whenever a house is not connected to the city sewer system, the house will usually have one of two different types of septic systems. The first and most common type is a septic tank with a soil drain field. The second type is an aerator system that has sprinkler heads to disperse the processed wastewater. Indications of a malfunctioning system include visible signs of seepage and a strong sewage smell, which is a Red Flag. A septic system within 50 feet of a water well, underground cistern, stream, lake, pond, sprinkler system, or swimming pool is a Red Flag.

Garage Door Springs

Garage door springs are designed with a wire or cable through the center so that if the spring shatters, pieces do not fly through the air like bullets. If no such wire or cable exists, it is a safety hazard, and this is a Red Flag.

Recreational Hazards

Swimming Pools and Spas

Check for levelness: measure the distance from the rim of the pool to the surface of the water. The water should be within ½ inch of the same level all around the pool. If it is not, a problem may exist. If the pool is built on a hill and the water level is much lower on the uphill side than on the downhill side, it is possible the pool has tilted. This condition is definitely a Red Flag.

The sides and bottom of the pool should be sound and free from cracks. Many pools have experienced some concrete shrinkage during construction; therefore, one or two hairline or minor cracks are common. If an open crack is observed, a problem exists, and a professional pool inspection would be appropriate.

Inspect the decks around the pool for cracks with the same method used for patio slabs or sidewalks.

Be aware of any electrical cables within 22 feet of the surface of the pool or 14 feet in any direction from the diving board. If any exist, this is a Red Flag.

All swimming pools or spas are required to have a barrier 48 inches high surrounding them, and the barrier must not allow passage of a four-inch diameter sphere. Any violation of these requirements is a Red Flag.

Tennis Courts

Tennis courts are usually concrete or asphalt constructed over a base of crushed rock and dense or compacted soils. It is important for the court to be in good condition because it is a valuable asset. Tennis courts should be slightly higher in the

center than on the sides so water can drain off. Water should not form puddles on the court.

Both asphalt and concrete tennis courts should be inspected for cracks and settlement in the same manner used for driveways. Short cracks pointing in random directions could merely mean the asphalt is aging and has not been maintained. Longer cracks, particularly open ones, could be caused by expansive soils or settlement of fills.

Play Structures

Play structures for children, such as tree houses or elaborate swing systems either free-standing or in trees, can be quite hazardous. If you feel any of these structures are a safety hazard, Red Flag them for a professional carpenter and/or structural engineer to conduct a closer inspection.

Illegal Additions

Illegal additions to houses are a very common problem. A real estate professional who notices a specific area of the house that does not appear to be built with the same style and/or quality as the rest of the house should question the owners to see if they are aware of any additions to the house without proper permits. If the present owners are not aware of any additions, the agent or broker should ask them to clarify if additions were made before their purchase.

Many additions built without a permit are built by people who are not aware of local building, electrical, plumbing, and/or mechanical codes. Therefore, these additions are possible safety and fire hazards. Illegal additions are Red Flags.

case study **Case Study 1**

Steve and Jenny Park are recently married and looking to purchase their first house. They contacted a real estate agent, Bryan, and told him they wanted to look only at Colonial style homes located on a hillside. Two days later Bryan contacted them and set up an appointment for the next day to preview several houses. When the Parks met Bryan the next day, he assured them that each of the houses they were going to look at was in great shape and was a terrific buy, and they should not worry about anything, because he had conducted a Red Flag inspection of these properties.

The first house was a beautiful two-story Colonial sitting on a hillside. They arrived at the house and decided to view the inside first; if they liked the inside, they would look around the outside. The Parks told Bryan they loved the inside of the house and were ready to look at the surrounding grounds. As they toured the outside, Steve noticed that the dirt was falling away from the patio and driveway. He asked Bryan why the dirt was either missing or was sliding away from these two areas. Bryan looked very puzzled and told them he did not have any idea why, but said he would try to find out for them.

1. What should Bryan do to further investigate the dirt moving away from the patio and driveway?

a. Call the owners and ask if they have a dog that might have dug around these areas
b. Shrug it off as just washaway from rainfall and tell the Parks it is not important
c. Go to the county records office and/or to the original builder and see if the house was built on landfill
d. Return to the house later with a more experienced real estate agent and ask for his or her advice on how to handle this situation

Discussion question: Should Bryan have spent more time viewing the properties he was going to show the Parks before the visit? What else could he do to prevent awkward moments like these?

case study Case Study 2

Judy and Bruno Giddies were looking for an investment property in an older area of town that was starting to make a comeback. They contacted Terri at the local realty company and explained to her what they were trying to do. Terri took down their information and told them she would research this area and call them in two days with houses for their review.

Terri pulled the database for the desired location of town and found several houses at the size and price Judy and Bruno were looking for. Terri, not being familiar with pier-and-beam houses, consulted with Gary, one of the more experienced brokers in her company. Gary told Terri that there are several things that are strategically important when you are looking at a pier-and-beam house.

2. What pier-and-beam items of importance did Gary tell Terri to always remember?
   a. The access entry to the crawlspace is 12" × 12", the piers are always wood, and the beams are always metal.
   b. The access entry to the crawlspace is 12" × 18", the piers are usually wood, the beams are usually not touching the pier, and water is never allowed under the house.
   c. The access entry to the crawlspace is 18" × 24", the piers are made from many types of materials, the beams must rest on the pier, and water is never allowed under the house.
   d. The access entry to the crawlspace is 12" × 24", the piers are always metal, the beams are usually half as big as the pier, and the plumbing is always on the ground under the house.

Discussion question: Should Terri have told Judy and Bruno she was not familiar with this type of house and referred them to another agent, or did she handle this correctly?

■ Review Questions

1. All of the following types of cracks in a concrete driveway, sidewalk, patio, or garage floor are Red Flags EXCEPT
   a. cracks that are open enough to insert a No. 2 pencil tip.
   b. several hairline cracks.
   c. significant cracking between a patio's edge and the home's foundation.
   d. a few wide-open or dramatically offset cracks.

2. Cracks in foundations are common. They may indicate a normal condition or a severe problem. A Red Flag exists if one of three conditions is present: (1) if there is one crack showing a suspicious foundation movement; (2) if there are many hairline cracks, especially if clustered in one place; and (3) if
   a. there is one horizontal hairline crack.
   b. there is a crack in a mortar joint.
   c. there are several severe cracks.
   d. there is a uniform crack between the slab floor and the foundation wall.

3. To properly inspect an ordinary foundation, you should walk along the outside of the foundation looking for cracks at a distance of not more than _____ feet.
   a. three
   b. five
   c. seven
   d. nine

4. A visually distorted structure is a structure that
   a. presents an unappealing architectural image.
   b. has been affected by adverse weathering conditions.
   c. has been affected by deferred maintenance.
   d. has been affected by foundation movement.

5. Generally, good drainage exists if
   a. water gathers in puddles next to the foundation.
   b. the ground surface adjacent to the home slopes toward the foundation.
   c. no water is allowed to pool or flow next to the home's foundation.
   d. water from downspouts flows into planter boxes adjoining the home.

6. You are inspecting a property prior to taking a listing and notice that in the side yard there are several retaining walls built like steps going up the slope. You should
   a. include in your inspection report that the property is subject to landslides.
   b. say nothing because they might be a part of the overall landscaping.
   c. ask the homeowner why they were built.
   d. refuse the listing.

7. When inspecting a house built on a fill, the term *creep* refers to
   a. upward movement of dirt, sand, and rock around the foundation.
   b. movement of patios, driveways, and other slabs on the uphill side of the home.
   c. movement of patios, driveways, and other slabs on the downhill side of the home.
   d. the vertical distance of travel.

8. You are inspecting a property prior to taking a listing and notice that there are signs of roof leakage. You should
   a. include in your inspection report that the property is subject to roof leakage.
   b. say nothing because the owner can paint over the stains.
   c. point out the problem and suggest that a licensed general contractor or a roofing contractor be called in to do an inspection.
   d. tell the owner to get the roof fixed.

9. When inspecting a property, particular attention should be paid to good-sized trees or bushes that are less than _____ feet from the side of the house.
   a. eleven
   b. nine
   c. seven
   d. five

10. Tree branches that extend completely over the house roof are
   a. beautiful and are a great source of shade.
   b. a cause of transpiration under the foundation.
   c. going to fill the gutters with leaves in the fall.
   d. why you need a good foundation repair company.

11. The slope away from the house should be
   a. 8 inches in 11 feet.
   b. 10 inches in 6 feet.
   c. 6 inches in 9 feet.
   d. 6 inches in 10 feet.

12. A pier-and-beam foundation has
   a. a crawlspace under the house.
   b. an entry access of 10" × 24".
   c. many ventilation openings around the foundation.
   d. screened or mesh wire protecting against rust.

13. A garage door spring has a wire or cable inside to
   a. help tighten the spring.
   b. help keep the garage door in the tracks.
   c. add extra cost to the door.
   d. prevent injury if the spring breaks.

14. When mold lands on a moist area in the house, it
   a. dies, as mold cannot survive in wet moist areas.
   b. begins to grow into any pore of your body.
   c. may begin growing and digesting just the wood portions of the area it lands on.
   d. may begin growing and digesting whatever it is growing on in order to survive.

15. Electrical lines must be ___ feet away from a pool.
   a. 22
   b. 14
   c. 18
   d. 10

chapter three

Inspecting for Red Flags Inside the Home

learning objectives

Upon completing this chapter, you will

- be aware of and learn to pay special attention to the several areas inside the home that can contain Red Flags.
- recognize the importance of the proper installation of stairs.
- know the procedures for detecting Red Flags in areas of the home such as floors, doors and windows, fireplaces, stairways, and glass panes.
- be able to discover possible locations for concealed Red Flags and be aware of the reasons for concealment.
- know how to identify Red Flags associated with the mechanical systems of the house.
- understand the hazards of various mechanical items in the house.

Key Terms

efflorescence
ionization smoke detector
photoelectric smoke detector
riser
seismic strap
tempered glass
tread

Basements and Crawlspaces

The same method used for inspecting foundations should be used for inspecting basement walls. Walk along the basement walls no farther than five feet away from the foundation using a strong flashlight and note the type, location, and angle of any existing cracks.

Be alert for white, powdery deposits along foundations and walls, especially if there are also visible water stains. This mineral deposit is referred to as **efflorescence**. These minerals are from calcium carbonates and calcium sulfates. Efflorescence is

an indication of repeated occurrences of moisture seepage in the basement or crawlspace. Look for a sump pump in the lowest part of the basement floor. If there is a sump pump, it most likely has been installed as a result of incoming water. Always ask the owners if water has ever accumulated in the basement or crawlspace.

If evidence of significant and abnormal moisture conditions is observed, a Red Flag condition exists. The existence of a sump pump or previous flooding is a Red Flag and should be appropriately disclosed.

Wall Cracks

Cracks develop in the walls of houses for a number of reasons. For instance, the wooden framing of the house may dry out and shrink shortly after the house is built. Almost every home has a few hairline cracks caused by shrinkage of wood. However, differential movement of the structure may occur, caused by foundation movement or a structural defect that can cause significant wall cracking.

When inspecting for cracking, pay particular attention to common crack locations such as the corners of windows, doors, and the walls of rooms. Consciously look for cracks behind curtains and on ceilings throughout the house and make written notes of the amount and severity of any cracking observed. When you see significant amounts of cracks in a specific area, serious distress to the home may have occurred, indicating a Red Flag condition.

Small hairline cracks at the corners of a few windows or doors without other indications of possible distress to the house normally would not be considered a Red Flag. However, significant amounts of diagonal cracking or large cracks showing offset or spaces should be considered a Red Flag. Minor cracking or hairline cracking associated with other indications such as sloping floors or sticking windows or doors would in combination be considered a Red Flag.

Concealed Red Flags

Homeowners commonly paint and patch homes for aesthetic reasons prior to selling them. However, often they inadvertently conceal or hide indications of defects. Therefore, the broker or agent should make an effort to determine if Red Flags have been concealed. The most common types of Red Flags that are concealed include wall cracks, torn and/or puckered drywall tape, wall water stains, and sticking doors and windows.

Often a patched wall area will have a different surface texture from the rest of the wall. The color of the paint may also be slightly different. Where wallpaper has been used to redecorate walls, cracks can be concealed. Some of the time the cracks can be felt with the fingertips. In general, where the existence of hidden or concealed Red Flags is suspected, the inspection should be conducted with even more caution and intensity.

House Alignment

Sloping Floors

In a typical home, floors are sufficiently level, and any sloping can be determined only by precise measuring. Any noticeable sloping indicates distress and is a Red Flag.

You should also note whether the floors feel springy. A very springy floor indicates a possible problem with the interior floor structure or the foundation and is a Red Flag.

Brokers and agents should look for cracks in all tile and marble floors. Often, cracks are merely an indication of improper floor construction, but cracks may also indicate distress, especially if other symptoms exist. A continuous vertical crack that covers three sections of marble or tile in the floor is always a Red Flag.

There are two simple tests that reveal the levelness of a floor. When performing these tests, pay particular attention to the possibility that the outer walls of the house may have settled relative to the interior walls.

Test 1—Shuffle Walk. Walk across the floor quickly without lifting your feet. Keep the front part of your shoes on the floor. Move toward the outside walls of the house. Walking this way makes you much more sensitive to slope. If the floor is not level, you will experience a feeling of going downhill.

Test 2—Ball-Rolling. Use a smooth ball, such as a racquetball. First, place it on an uncarpeted floor near the middle of the room and see if it rolls. Then try placing the ball in several spots around the room. If the ball rolls to the same spot repeatedly, that spot must be lower than the rest of the floor. Any evidence of sloping should be noted as a Red Flag.

Sticking Doors and Windows

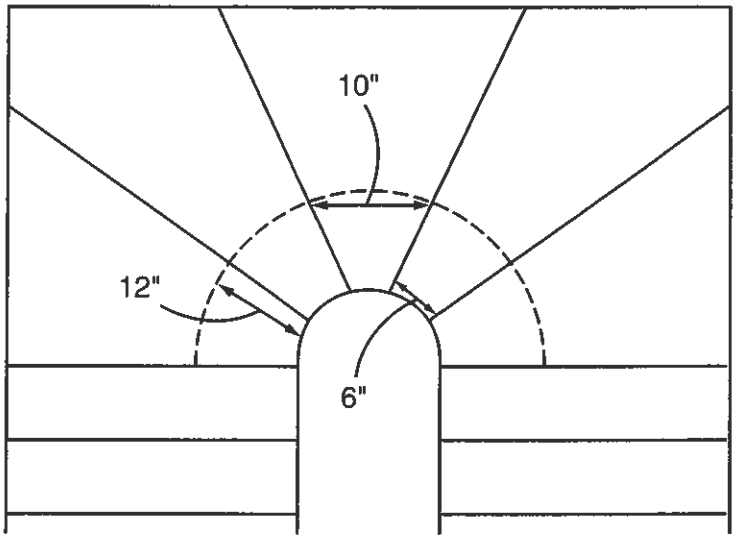
There are two things to look for when inspecting doors and windows: (1) sticking when you open or close them and (2) uneven spaces between doors and their frames. These two symptoms usually mean movement of the walls and floors have changed the shape of the window or doorframe.

All doors and windows in the house should be opened and closed to determine if they are sticking or if they close properly. This includes doors of cupboards and cabinets in the kitchen and bathrooms. If sticking occurs, determine the point where the door or window is rubbing against the frame and document this information.

Inspecting a door. Look at the spaces at the top and bottom. The width of the space should be the same at the right and left sides, shaped like a long narrow rectangle and not a triangle. Uneven spaces usually mean the doorframe has been distorted and is no longer a rectangle, while the door itself has not changed shape. Also look for signs that the door has been sawed or sanded to make it fit the crooked frame.

If doors and windows do not open and close easily, if unusual spaces are seen, or if there are signs of sanding or cutting, a note should be made of which door and exactly what seems to be wrong with it. All of these various situations are Red Flags.

Figure 3.1 | Winding Stairs



Hazardous Stairs

Stair Treads and Risers

The **tread** is the horizontal part of the stair. It is measured from the back to the front edge of the stair.

The minimum tread depth shall be 10 inches. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than ⅜ inch.

Winder treads shall have a minimum tread depth of 10 inches, measured as above, at a point 12 inches from the side where the treads are narrower. Winder treads shall have a minimum tread depth of 6 inches at any point. (See Figure 3.1.)

The **riser** is the vertical member between two treads.

The maximum riser height shall be 7¾ inches, measured vertically between the leading edges of the adjacent threads. The greatest riser height within any flight of stairs shall not exceed the smallest by more then ⅜ inch.

As you walk up or down a flight of stairs, you will fall into a certain rhythm and you will notice if one of the stair risers is a different height.

Fireplaces

There are several types of fireplaces you will encounter during your real estate career. These are freestanding, open-front, open-two-sided, open-three-sided, open-four-sided, and prefabricated. The fireplace is always built after the foundation is cured. Some fireplaces are built on top of a foundation wall; some have their own footing, which is 12 inches below the finished grade. Most fireplace structures are much heavier than the house structure (on a pounds-per-square-foot basis) and may settle, even if the home does not. Settling may cause a few

hairline cracks where the edge of the fireplace meets the wall, but these usually are not serious.

Stand three to five feet away from the fireplace and inspect it from top to bottom. Remember, you have already inspected the chimney outside the home. Be sure to pull away the hearth screen and inspect inside the fireplace.

Most codes require a fire-resistant hearth in front of a fireplace for a distance of 18 inches. Often the hearth is constructed of the same material as the fireplace, (bricks, stone, etc.). Woodwork or other combustible materials shall not be placed within 6 inches of a fireplace opening. Combustible material within 12 inches of the fireplace opening shall not project more than ⅛ inch for each 1-inch distance from the opening [IRC R1003.12]. Combustible items closer to the fireplace opening than stated in this code constitute a safety hazard and a Red Flag.

If severe settling has occurred, cracks may appear in the mortar between the bricks or diagonally through the bricks. Significant cracking is a Red Flag. Open cracks in a fireplace can be a very serious safety hazard and are a Red Flag. If cracks in the fireplace, especially in the firebox, are observed, an appropriate expert should inspect it.

■ Sagging Beams

If portions of a building are improperly sized, the wrong building materials are used, or proper construction methods are not followed, distress to a home can occur. It is normally beyond the ability of a real estate professional to detect such problems. However, there are a few obvious symptoms, such as sagging beams, that may be seen in the course of a visual inspection.

Sagging beams can be easily detected, especially if they are so much lower in the middle that the unevenness can be seen with the naked eye. In milder cases, there may be cracks where the beam connects to the framing of the house. These conditions should be disclosed as possible Red Flags. An inspection by a structural engineer or building contractor is recommended.

■ Major Mechanical Systems

The common major house systems are electrical, plumbing, heating, and air-conditioning.

Electrical System

Check for loose, damaged, and malfunctioning receptacles and wall switches. Look for burn or scorch marks. Extension cords underneath carpets or stapled along baseboards are hazardous and illegal. Such conditions are Red Flags.

The *International Residential Code* (IRC) and most state and local codes prohibit bare wire of any type in houses and garages. "A box or conduit body shall be installed at each conductor splice point, outlet, switch point, junction point and pull point except as otherwise permitted in sections IRC E3805.1.1 through IRC E3805.1.7 [IRC 3805.1]". Any receptacle outside must have the proper covering to protect it from the elements. "All boxes located in damp or wet locations shall be placed or equipped so as to prevent moisture from entering or accumulating

within the box, conduit body or fitting. Boxes, conduit bodies and fittings installed in wet locations shall be listed for use in wet locations [IRC 3805.11]." Any violation of these two conditions is a Red Flag.

Electrical service panels should be accessible for electrical shutdown purposes. Furniture or debris blocking access to the electrical panel constitutes a safety hazard. An electrical service panel in a clothes closet is a Red Flag. A locked or inaccessible electric switch panel is a Red Flag.

Before you open the main circuit breaker box, you should place the *back* of your hand on the door to see if it is warm or gives an electrical shock. If you use the palm of your hand and there is an electrical charge present, your hand will lock onto the panel. If the panel is warm or gives an electrical shock, a qualified electrician should be called immediately!

If you find the panel in good condition, open the panel to view the inside. Panels with holes or missing knocked-out plates are a safety hazard and code violation. "Unused openings in boxes, cabinets, equipment cases or housings shall be effectively closed to afford protection equivalent to the wall of equipment [IRC 3304.5]."

As everyone knows, it is not the voltage that will hurt you, it is the amperage and the right conditions. It takes only 0.1 to 0.2 of an amp to disrupt a person's heartbeat and cause death. The ground fault circuit interrupter (GFCI) was created to prevent electrical shock and deaths. "All 125 volt, single-phase, 15- and 20-amphere receptacles that serve countertop surfaces shall have ground-fault circuit interrupter protection for personnel [IRC E3802.6].

Arcing faults are one of the major causes of electrical fires. Arcing faults most often occur in deteriorated and/or damaged wiring. The puncturing of the wire while hanging items on a wall or when the installer shoots a cable staple into the wiring, and the poor installation of outlets and/or switches usually cause deteriorated and/or damaged wiring. There are also other types of arcing hazards that the owners can cause themselves. Almost all of these are when extension cords are used improperly; for example, extension cords shut in closed doors or placed under a furniture leg, couches and chairs or cabinets pushed up against plugs in an outlet, and extension cords placed over heating registers or in direct sunlight, which can cause too much heat in itself. In 2002 the National Electric Code implemented the use of Arc Fault Circuit Interrupters (AFCI). "All branch circuits that supply 125-volt, single-phase, 15- and 20-amphere outlets installed in dwelling unit bedrooms shall be protected by an arc-fault circuit-interrupter listed to provide protection of the entire branch circuit [IRC E3802.11]."

Incandescent luminaries with open or partially enclosed lamps and pendant luminaries are prohibited in clothes closets [IRC 3903.11].

If you encounter any of the above situations, an inspection by a licensed electrician is recommended.

Turn on and off all light switches and built-in electrical appliances such as the stove, dishwasher, and laundry facilities. This is not required as part of the inspection, but it is advisable and prudent.

Plumbing System

Sit on the water closet (toilet) and wiggle to see if it is stationary. If the toilet moves, this is a Red Flag. Then flush the toilet to make sure it is in good working condition. If the toilet takes a long time to fill, this is a Red Flag. Turn on all water taps. Do they drip when turned off? Is the hot on the left and the cold on the right? Does the water pressure decrease when you turn on more than one faucet? If the hot and cold water are reversed, the faucet drips, or the water pressure decreases when you turn on more than one water outlet, a Red Flag is present. If the water source is a private well, have the nearest water district test water samples for safety.

Gas and electric shutoffs must be accessible for quick and easy turnoff. Each gas appliance shall be provided with a shutoff valve separate from the appliance. "The shutoff valve shall be located in the same room as the appliance, not farther than six feet from the appliance, and shall be installed upstream from the union connector or quick-disconnect device it serves" [IRC G2420.5 (409.5)]. Locked or inaccessible gas valves or electric switches are Red Flags.

When you inspect the water heater, look on the top of the tank to see if there are signs of water stains from an improperly sealed exhaust pipe. Are any of the water pipes leaking? Are there any rusty areas and/or water stains at and around the base of the water heater? The water heater requires a pan (not less than 1½ inches deep) when it is installed in an area where leakage could cause damage.

Make sure the water heater is equipped with a temperature/pressure relief valve (TP&R), usually located on top of the water heater. When the temperature reaches 210 degrees Fahrenheit, the relief valve is activated and hot water is discharged. The TP&R valve must be piped to the outside or to an indirect waste receptor located inside the building. A lever manually activates the valve for testing. *Unless you know that the valve has been tested every year since the water heater was installed, it is not a good idea to activate this manual lever.* If TP&R valves have not been tested every year, most do not close properly; they could cause water damage after the broker or agent leaves the house. If the water heater is not equipped with this necessary and required safety device, this is a Red Flag.

If a gas water heater is located in the garage or in an area adjacent to the garage, it should be mounted on a platform at least 18 inches off the floor. The IRC and most local building codes require that the pilot flame of a water heater be a minimum of 18 inches from the floor to minimize the chance of gasoline fumes building up near the floor and being ignited by the water heater pilot light. This is a very important safety factor; the location and general condition of water heaters should be checked during a property inspection. If the water heater is mounted in violation of this code, a Red Flag is present.

In many states water heaters are required to be secured by a **seismic strap**, a metal or fabric belt that holds the water heater erect in the event of an earthquake. Many jurisdictions require energy blankets on water heaters to minimize heat loss. You need to note that some water heater manufacturers' warranties are voided if you apply an energy blanket, so you should have the property owner verify whether this blanket is required.

The absence of proper ventilation for water heaters and furnaces can be a serious hazard. Such ventilation requirements are relatively technical in nature. However, if no ventilation is apparent, a Red Flag condition exists.

Heating and Air-Conditioning Systems

Locate the thermostat and set the control to heat. Increase the setting to 10 degrees higher than the present temperature reading on the thermostat. The furnace should ignite and start to pump warm air into the room. Move the switch from heat to off. Wait approximately 20 minutes, then return to the thermostat and move the control to cool. Decrease the setting 15 degrees below the temperature reading on the thermostat. The air-conditioning unit should start pumping cooler air into the room. *You should not test the air-conditioning system if the outside temperature is below 60 degrees. This could cause damage to the compressor.* If the furnace does not ignite and pump warm air or the air-conditioner does not pump cooler air, this is a Red Flag.

Glass

Large windowpanes, windows next to doors, sliding glass doors and other doors with glass, shower doors, and mirrors are all subject to human impact and pose a potential safety hazard if broken. The IRC requires all glass elements of a house located within 18 inches of the floor to be of safety/tempered glass. **Tempered glass** is a glass that is prestressed by heating and then rapidly cooled. This process makes the glass two to four times stronger than ordinary glass. Tempered glass will shatter into pebbles instead of breaking into slivers. Tempered glass is required for all windows less than 60 inches (5 feet) above the tub or shower pan. All glass shower doors must open outward.

Either the word *safety glass* or *tempered glass* with a monogram is etched on all panes of safety glass. In today's world it is not always easy to see these etchings. In case you cannot be sure, consult a glass professional for verification.

Smoke Detectors

The United States is a world leader in death from home fires. As we all know, smoke detectors can reduce the risk of someone's dying in a house fire by at least 50 percent. This is true only if the smoke detectors are in working order.

Based on a government survey from 1994 to 1995 as part of the "National Smoke Detector Project," we learned that an estimated one of every four homes that were equipped with smoke detectors had detectors that did not work properly. This study also found that there were more homes with smoke detectors that did not work than homes without smoke detectors.

Types of Smoke Detectors

There are two kinds of smoke detectors on the market today: ionization and photoelectric.

An **ionization smoke detector** has a small quantity of radioactive material in the sensing chamber that throws off a constant stream of radioactive particles, creat-

ing an electric charge in the chamber. When smoke enters the electrically charged chamber, it reduces the electric charge, thereby causing the alarm to sound.

A **photoelectric smoke detector** has a beam of light inside the sensing chamber. When the light beam is deflected or broken, the alarm will sound.

An ionization detector is the most common of the two detectors. It is estimated that three of every four detectors in U.S. homes are ionization models. The reason for this is simple: they are much less expensive than photoelectric detectors.

However, ionization detectors have serious problems. They are prone to false alarms, the technology itself is problematic, and these devices are designed to detect advance particles of combustion, which causes the detector to respond to the minutest airborne particles. Even the most routine of household activities can set these off—for example, cooking, cleaning windows, or taking a shower.

Common reasons smoke detectors may not work:

- Batteries are dead or missing.
- Vents are clogged with dirt, dust, or grease.
- The sensing chamber is infested with small insects.

Proper Testing of a Smoke Detector

The "test button test" is not a true test of a smoke detector. The only function this tests is the test button function itself. It does not test the "smoke detector" function. If a smoke detector's vents are clogged with dust, dirt, grease, or insects, smoke will not activate the alarm; however, pressing the test button will usually result in the alarm sounding.

WEB LINKS
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The best way to test a smoke detector is to use an aerosol product that has been tested and approved by a recognized testing facility such as Underwriters Labs. The product should meet the National Fire Protection Association's code 72. You can purchase this "smoke detector tester" at *www.professionalequipment.com*. When using this aerosol-testing product, you will need to follow the instructions on the can's label. By doing this simple test, you can find out if your house is one of the 16 million homes in America estimated to have faulty smoke detectors.

Replacement of Batteries in Smoke Detectors

The batteries in a smoke detector should be changed no less than once a year. The best way to remember this is to change your batteries when you set your clocks forward or back.

All smoke detectors that are ten years old or older should be replaced! These units have gone through millions of testing cycles checking the immediate surroundings for smoke. Even a smoke detector powered with household current and with a battery backup needs to be replaced after ten years.

In many states, new homes are required to have permanently built-in smoke detectors. Many jurisdictions require smoke detector installations in buildings that are being sold. Smoke detectors save hundreds of lives each year, and we advise that every residence have such alarms in appropriate locations. Smoke detectors are required in each bedroom and adjoining hall, and at least one is

required in each story and in the basement. Brokers and agents should document the existence or absence of smoke alarms in homes they view.

case study Case Study 1

Joe and Paula Bloom are looking for a one-story ranch-style home in the suburbs and are working with Sharon, a local REALTOR®. Sharon identified a dozen such houses in the surrounding area and is meeting with the Blooms tomorrow.

Joe, Paula, and Sharon spend the whole day looking at the 12 houses and have identified three they want to look at again. The next day they return to each of the three houses and finally decide on one beautifully decorated house on a hillside. Joe decides they should return to the house for a final look at the property.

As Joe is walking through the living room, he notices that the paint at the top of the doors and windows is a different shade or tint from the rest of the room. Joe asks Paula and Sharon if they notice the difference. Both agree with him, and they all start to look throughout the house for any other places the paint does not match. After a more thorough look at the house, they find many such places above the doors and windows. They also notice that the master bath floor is built up an inch higher than the master bedroom floor and the bathroom door looks as if the bottom has been cut off to meet the height of the new floor.

1. This house is an example of
   a. poor maintenance by the owners.
   b. an owner trying to hide the house's defects.
   c. an owner running out of one color of paint and buying the wrong color.
   d. an agent missing the concealed Red Flags.

Discussion question: Should Sharon have spent more time during her Red Flag inspection taking a closer look at all of the interior walls?

case study Case Study 2

Richard and Juana are new real estate agents and are going to their first listing to complete a Red Flag inspection. They are very nervous because they do not want to miss anything that could cause them trouble later.

As they walk through the house they make note of all of the different cracks and their locations on the walls and ceilings. They test all of the doors and windows to make sure they open and close properly. They checked all of the sinks, tubs, and water closets for proper water flow and drainage. They operate all of the light switches and they test both the air-conditioning and furnace. They enter the garage and test the garage door, the door exiting the garage to the yard, and all of the lights, and measure the water heater to see if it is 18 inches from the floor. They discuss what else they think they need to do and decide they are finished with the Red Flag inspection.

2. Richard and Juana failed to
   a. make sure that the smoke detectors are in all of the locations required.

b. inspect the fireplace for cracked brick, firebrick, and the location/distance of combustible materials around the fireplace.

c. check for tempered glass in the shower stall and any other window located within 18 inches of the floor.

d. All of the above

Discussion question: What would be helpful to agents conducting their first Red Flag inspection?

Review Questions

1. When inspecting a basement or crawlspace for Red Flags, you should always ask the owner questions concerning
   a. visible cracks in the slab.
   b. water accumulation or abnormal moisture conditions.
   c. ceiling height.
   d. expansion possibilities.

2. Cracks develop in the walls of houses for a number of reasons. The most common reason for wall cracks is
   a. differential movement of the structure.
   b. foundation movement.
   c. drying and shrinkage in the wooden framing members of the house.
   d. blasting from a rock quarry.

3. Before a broker or agent opens an electrical service panel, she should
   a. touch the cover with her finger.
   b. tap the cover with the heel of her hand.
   c. touch the cover with the back of her hand.
   d. grab the opening device and open the panel.

4. In a typical home, floors are sufficiently level. There are two simple tests that reveal the levelness of a floor. One is the shuffle walk test and the other is the _____ test.
   a. ball-rolling
   b. rolling-pin
   c. line-of-sight
   d. plumb-bob

5. Movement of walls and floors can affect the operating ability of doors and windows. There are two Red Flags that detect this movement in doors and windows: one is sticking when opening or closing, and the other is
   a. when cracking appears on the door or window.
   b. when the mitered joints in the window or door trim separate.
   c. when the door or window will not lock.
   d. uneven spaces between windows or doors and their frames.

6. When inspecting a house that has a fireplace, a few hairline cracks may be seen where the edge of the fireplace meets the wall. These are usually not serious and are not Red Flags because
   a. they occur for no reason.
   b. they occur around all fireplaces.
   c. they occur because most fireplace structures, on a pounds-per-square-foot-basis, are much lighter than the house structure and the home may settle, even if the fireplace doesn't.
   d. they occur because most fireplace structures, on a pounds-per-square-foot-basis, are much heavier than the house structure and may settle, even if the home doesn't.

7. How many major mechanical systems are contained in the average home?
   a. 2
   b. 4
   c. 6
   d. 8

8. A major development in one of the mechanical systems in a residence is a ground fault circuit interrupter (GFCI). A GFCI is
   a. a warning device in the event of an earthquake that indicates the severity of the shock.
   b. a cushioning device to absorb the shock waves in the event of an earthquake.
   c. a device that automatically shuts off the water supply in the event of an earthquake.
   d. a special electrical outlet (plug-in unit) that acts as a circuit breaker to shut off the electric current so fast that a hazardous current never develops.

9. All water heaters should be equipped with
   a. ground fault interrupters.
   b. a method of properly venting carbon monoxide gas.
   c. a temperature/pressure relief valve.
   d. double heating elements.

10. A Red Flag condition on an electric water heater in a garage is indicated when
    a. it is not mounted on a platform at least 18 inches above the garage floor.
    b. it is not properly provided with combustion air.
    c. rust and water spots show around the base.
    d. it is not at least 24 inches from the nearest combustible wall material.

11. When a vertical crack crosses over ___ or more tiles, a Red Flag is present.
    a. 4
    b. 2
    c. 5
    d. 3

12. Woodwork and/or any other combustible material must be ___ inches away from the fireplace opening.
    a. 18
    b. 6
    c. 12
    d. 9

13. Tempered glass is required
    a. within 18 inches of the floor.
    b. within 60 inches of a tub or a shower pan.
    c. within 12 inches of the floor.
    d. Both a and b

14. A water heater requires a pan not less than _____ inches deep when it is installed in an area where leakage could cause damage
    a. 1¼
    b. 1½
    c. 1⅜
    d. 1⅝

15. What type of lamps are not allowed in a closet?
    a. Round fluorescent
    b. Recessed incandescent
    c. Enclosed incandescent
    d. Incandescent

chapter four

Red Flags Associated with Environmental Hazards and Hazardous Materials

learning objectives

Upon completing this chapter, you will

- be aware of the adverse effects of hazardous materials on residential property values.
- know the various types of hazardous materials that may be present in a residential property.
- recognize where hazardous materials may be located in or around a residential property.
- know the Red Flag indicators identifying these materials and the names of various federal agencies that can provide additional information.

Key Terms

asbestos
lead poisoning
radon gas
toxic waste

Hazardous Materials

Hazardous materials are a problem that can adversely and dramatically affect property values, and they have been recognized as serious health issues in recent decades. In the 1970s asbestos was eliminated from house construction products. Every state has passed disclosure laws that instituted stricter storage and cleanup regulations for toxic waste.

All of us need to understand that there are hundreds of "hazardous materials" in our houses. They are present in items we regularly purchase and then store in and around our houses without any worry. Some homeowners will sometimes unknowingly dump these harmful products onto their property. When these hazardous materials are dumped onto our land instead of being disposed of properly, they create problems with the land they were dumped onto, and they create problems in our water systems.

Have you ever dumped cleansers, bleach, oils, paints, lacquer thinners, car batteries, medicines, or various pesticides in your yard? If so, you have unknowingly turned a common household, motor vehicle, or human-use product into a "hazardous material."

There are four major classifications of hazardous materials: corrosive, toxic, reactive, and ignitable.

A corrosive material will gradually dissolve or wear away other substances. Corrosive materials are chemical compounds that are safely contained in one type of container, usually plastic or metal, but if placed in a different type of container may eat through and/or dissolve that container. Two commonly used corrosive household products are drain cleaners and oven cleaners. The hazardous chemicals in these products are usually a type of acid or lye, both of which will usually eat your skin away, so any products that have instructions that tell you to "use plastic gloves" are in this category.

A toxic material almost always has a poison identification on the container, usually accompanied with the skull and crossbones symbol. Two of these commonly used household products are mothballs and, again, oven cleaner.

A reactive material is one that is fine when it is in a container by itself, but if you mix this product with another everyday product, there is a possibility of toxic gases and/or an explosion. Two of these commonly used products are ammonia and chlorine bleach.

An ignitable material is very easy to identify, as the container will have an explosive and/or flammable warning label and/or sign. Two of these are almost always found in the garage: gasoline and cleaning items containing a high percentage of alcohol or a petroleum derivative such as naphtha. Naphtha is a volatile, often flammable liquid hydrocarbon mixture used chiefly as a solvent and diluent.

Everyone needs to understand that improper dumping of antifreeze from your car is very harmful to your pets or other animals in the area and that used motor oil constantly dumped on the property will leave a black barren area where the oil was dumped. All hazardous household and motor vehicle chemicals must be properly disposed of.

We all know that a useful product in the house or garage can, if disposed of improperly, become a hazardous material. None of us are professional hazard inspectors; therefore, our ability to identify a location on a property as a "hazardous dump site" is very limited. We can easy identify dead trees or foliage and barren spots from improper dumping, and these are Red Flags. But beyond that, a professional's keen eye is needed.

Asbestos

WEB LINKS

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The following information concerning asbestos has been adapted from materials prepared by the U.S. Consumer Product Safety Commission (CPSC) and the U.S. Environmental Protection Agency (EPA) for distribution to consumers. Copies of this material in booklet form titled "Asbestos in the Home" are available from the EPA for use by interested homeowners and prospective purchasers. Visit *www.epa.gov/asbestos/ashome.html.*

Asbestos is a mineral fiber found in rocks. There are several kinds of asbestos fibers, all of which are fire-resistant and not easily destroyed or degraded by natural processes.

Asbestos has been shown to cause cancer of the lung and stomach, according to studies of workers and others exposed to asbestos. There is no level of exposure to asbestos fibers that experts can assure us is completely safe.

Some asbestos materials can break into small fibers, which can float in the air and can be inhaled. You cannot see these tiny fibers, and they are so small that they pass through the filters of normal vacuum cleaners and return to the air. Once inhaled, asbestos fibers can become lodged in tissue for a long time. After many years, cancer or mesothelioma can develop.

Not all asbestos products pose a health risk. A health risk exists only when asbestos fibers are released from the material or product. Soft, easily crumbled asbestos-containing material, called *friable,* has the greatest potential for asbestos release and therefore has the greatest potential to create health risks. Nonfriable asbestos-containing materials do not present problems unless they are disturbed in some way.

Most people exposed to small amounts of asbestos do not develop any related health problems. Health studies of asbestos workers and others, however, show that the chances of developing some serious illnesses, including lung cancer, are greater after exposure to asbestos.

Asbestos has been used in a wide variety of products, including household and building material, such as appliances, ceiling tiles and coverings, wall and pipe coverings, floor tiles, and some roofing materials. Basically, asbestos has been used in products for four reasons: (1) to strengthen the product material, (2) for thermal insulation within a product, (3) for thermal or acoustical insulation or decoration on exposed surfaces, and (4) for fire protection.

Until the 1970s, many types of building products and insulation materials used in houses contained asbestos. Some roofing and siding shingles are made of asbestos cement. Houses built between 1930 and 1950 may have asbestos as insulation. Asbestos may be present in textured paint and in patching compounds used on wall and ceiling joints. Their use was banned in 1977.

The manufacturer of a product may be able to tell you, based on the model number and age of the product, whether or not the product contains asbestos. People who have frequently worked with asbestos (such as plumbers, building contractors, or heating contractors) often are able to make a reasonable judgment based on a visual inspection of whether a material contains asbestos.

Asbestos-Containing Products and Locations

When checking for Red Flags, take care to look for the following features that may cause a buyer to seek professional advice about the existence of asbestos and its removal.

Vinyl Floor Tiles and Vinyl Sheet Flooring. Asbestos has been added to some vinyl floor tiles to strengthen them. Asbestos is also present in the backing on some vinyl sheet flooring. The asbestos is often bound in the tiles and backing with vinyl or some other type of binder.

Patching Compounds and Textured Paint. In 1977, CPSC banned asbestos-containing patching compounds. Some wall and ceiling joints may be patched with asbestos-containing material manufactured before 1977. If the material is in good condition, it is best to leave it alone.

Some textured paint sold before 1978 contained asbestos. It is unlikely that asbestos is being added to textured paint today, based on information obtained from manufacturers by the CPSC. As with patching compounds, textured paint is best left alone if undamaged.

Ceilings. Some large buildings and a few houses built or remodeled between 1945 and 1978 may contain a crumbly, asbestos-containing material that has been either sprayed or troweled onto the ceiling or walls. If the material is in good condition, it is best to leave it alone. If the material appears damaged, the owner or buyer may want to consider having it repaired or removed.

If possible, contact the builder or the contractor who applied the ceiling coating to determine whether asbestos-containing material was used. If you cannot contact either of these individuals, contact an asbestos professional.

Common products that might have contained asbestos in the past and conditions that may release fibers include the following:

- *Steam pipes, boilers, and furnace ducts* insulated with an asbestos blanket or asbestos paper tape. These materials may release asbestos fibers if damaged, repaired, or removed improperly.
- *Resilient floor tiles* (vinyl asbestos, asphalt, and rubber), the backing on vinyl sheet flooring, and adhesives used for installing floor tile. Sanding tiles can release fibers. So may scraping or sanding the backing of sheet flooring during removal.
- *Cement sheet, millboard, and paper* used as insulation around furnaces and woodburning stoves. Repairing or removing appliances may release asbestos fibers. So may cutting, tearing, sanding, drilling, or sawing insulation.
- *Door gaskets* in furnaces, wood stoves, and coal stoves. Worn seals can release asbestos fibers during use.
- *Soundproofing or decorative material* sprayed on walls and ceilings. Loose, crumbly, or water-damaged material may release fibers. So will sanding, drilling, or scraping the material.
- *Patching and joint compounds* for walls and ceilings as well as *textured paints.* Sanding, scraping, or drilling these surfaces may release asbestos.
- *Asbestos cement roofing, shingles, and siding*—these products are not likely to release asbestos fibers unless sawed, drilled, or cut.

- *Artificial ashes and embers* sold for use in gas-fired fireplaces; also, other older household products such as fireproof gloves, stovetop pads, ironing board covers, and certain hair dryers.
- *Automobile brake pads and linings, clutch facings, and gaskets.*

Stoves and Furnaces

Stove Insulation. Asbestos-containing cement sheets, millboard, and paper have been used frequently in houses where wood- and coal-burning stoves have been installed. These materials are used as thermal insulation to protect the floor and walls around the stoves. The cement sheet labels should tell you if the sheet contains asbestos. This sheet material may be coated with a high temperature paint, which will help seal any asbestos into the material.

Asbestos paper or millboard is also used as a type of thermal insulation. If these materials have been placed where they are subjected to wear, there is an increased possibility that asbestos fibers may be released.

Furnace Insulation. Oil, coal, or wood furnaces with asbestos-containing insulation and cement are generally found in older houses. Updating the system to oil or gas can result in removal of or damage to the old insulation. If the insulation on or around the furnace is in good condition, it is best to leave it alone. If it is in poor condition or pieces are breaking off, the owner or buyer may want to consider having it repaired or removed by asbestos professionals.

Door Gaskets. Some door gaskets in furnaces, ovens, and wood or coal stoves may contain asbestos. The asbestos-containing door gaskets on wood- or coal-burning stoves are subject to wear and can release asbestos fibers under normal use conditions.

Walls and Pipes

Pipe Insulation. Hot water and steam pipes in some older houses may be covered with an asbestos-containing material primarily to reduce heat loss and to protect nearby surfaces from the hot pipes. Pipes may be wrapped in asbestos "blankets," or asbestos-containing paper tape. Asbestos-containing insulation has also been used on furnace ducts. Most asbestos pipe insulation in houses was preformed to fit around various diameter pipes. This type of asbestos-containing insulation was manufactured from 1920 to 1972.

Wall and Ceiling Insulation. Houses constructed between 1930 and 1950 may contain insulation made with asbestos. Wall and ceiling insulation that contains asbestos is generally found inside the wall or ceiling ("sandwiched" behind plaster walls). Renovation and house improvements may expose and disturb the materials.

Appliances

Some appliances are or have been manufactured with asbestos-containing parts or components. The CPSC is making an effort to identify household appliances that could release asbestos fibers during use. The CPSC has reviewed information on the use of asbestos-containing parts in broilers, dishwashers, refrigerators, ovens, ranges, and clothes dryers.

There has been a general decline in the use of asbestos in these appliances during recent years. When asbestos is used, it is in parts, which probably will not result in

the release of asbestos fibers during use. It is unlikely that asbestos components in these appliances present a significant health risk from release of asbestos fibers.

Roofing Shingles and Siding

Some roofing shingles, siding shingles, and sheets have been manufactured with asbestos-using Portland cement as a binding agent. Because these products are already in place and outdoors, there is likely to be little risk to human health. However, if the siding is worn or damaged, the owner or buyer may spray-paint it to help seal in the fibers.

Your Knowledge of Asbestos

As you can see, there are many different types and styles of products that incorporate the use of asbestos. Some of these you can easily identify; others you cannot. You also should be aware that you *should not* disturb asbestos. You must immediately Red Flag an identified source of asbestos.

If you are not sure, you can consult with the manufacturer of the product. If the manufacturer does not have the information you need, you can consult people who have frequently worked with asbestos material (such as plumbers, building contractors, or heating contractors). They often are able to make a reasonable judgment about whether a product contains asbestos based on a visual inspection. If all of these avenues fail, you need to contact the local EPA unit and ask for the help of one of its professionals.

Web sites to visit for more asbestos information:

WEB LINKS @

- *www.epa.gov/asbestos*
- *www.asbestos-institute.ca*
- *www.osha.gov/SLTC/asbestos*
- *www.cdc.gov/niosh/topics/asbestos*
- *www.osha.gov/dts/osta/oshasoft/asbestos*

Toxic Waste

There was a time when waste disposal problems—water wells polluted by septic systems or streams polluted by sewage outfalls—were regarded as isolated events no one could do much about until after a leak was detected. Today these problems are no longer regarded as inconsequential.

Some wastes can be highly toxic and long-lived. **Toxic waste** can pollute water supplies that serve an entire community, pollute the ground a community is built on, or even contaminate food if it is grown on polluted soils or irrigated with polluted water.

Water quality has become a significant public safety issue. Water well pollution from industrial sources, soil pollution in toxic dumps near or over which housing developments have been constructed (as in Love Canal, New York), and contamination of communities by floods carrying toxic runoff (as in Times Beach, Florida) continually reemphasize the need for communities to take precautions against pollution.

Web sites to visit for more toxic waste information:

WEB LINKS @

- *www.epa.gov*
- *www.ultram-and-tramadol-online.com/toxic-waste.html*

Radon

WEB LINKS
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The following information concerning radon has been adapted from materials prepared by the U.S. Environmental Protection Agency (EPA) for distribution to consumers. Copies of this material in booklet form, titled "A Citizen's Guide to Radon," is available from the EPA for use by interested homeowners and prospective purchasers. Visit *www.epa.gov/iaq/radon/pubs/citguide.html*.

Radon is a naturally occurring radioactive gas. You cannot see it, smell it, or taste it. Radon comes from the natural breakdown (radioactive decay) of uranium. Radon can be found in high concentrations in soils and rocks containing uranium, granite, shale, phosphate, and pitchblende. It may also be found in soils contaminated with certain types of industrial wastes, such as the by-products from uranium or phosphate mining.

In outdoor air, radon is diluted to such low concentrations that it does not represent a safety hazard. However, once inside an enclosed space (such as a house), radon can accumulate. Indoor levels depend on a building's construction and the concentration of radon in the underlying soil.

The only known health effect associated with exposure to elevated levels of radon is an increased risk of developing lung cancer. Not everyone exposed to elevated levels of radon will develop lung cancer, and the time between exposure and the onset of the disease may be many years.

Radon has always been present in the air. Concern about elevated indoor concentrations first arose in the late 1960s when houses were found in the West that had been built with materials contaminated by waste from uranium mines. Since then, cases of high indoor radon levels resulting from industrial activities have been found in many parts of the country. We have only recently become aware, however, that houses in various parts of the United States may have high indoor radon levels caused by natural deposits of uranium in the soil on which they are built.

Most houses in this country are not likely to have a radon problem, but some houses do have highly elevated levels. The dilemma is that, right now, no one knows which houses have a problem and which do not. You may wish to call your state radiation protection office to find out if any high levels have been discovered in your area.

How Does Radon Get into a House?

Radon is a gas that can move through small spaces in the soil and rock on which a house is built. Radon can seep into a house through dirt floors, cracks in concrete floors and walls, floor drains, sumps, sump pumps, joints and tiny cracks, or pores in hollow-block walls.

Radon also can enter water within private wells and be released into a house when the water is used. Usually, radon is not a problem with large community water supplies, where it would likely be released into the outside air before the water reaches a house. For more information concerning radon in water, contact your state's radiation protection office.

In some unusual situations, radon may be released from the materials used in the construction of a house. For example, this may be a problem if a house has a large stone fireplace or has a solar heating system in which heat is

stored in large beds of stone. In general, however, building materials are not a major source of indoor radon.

Because you cannot see or smell radon, special equipment is needed to detect it. The two most popular detectors are the charcoal canister and the alpha track detector. Both of these devices are exposed to the air in your house for a specified period of time and sent to a laboratory for analysis.

There are other techniques—requiring operation by trained personnel—that can be used to measure radon levels, but such techniques may be more expensive than the devices mentioned above.

Web sites to visit for more radon information:

WEB LINKS

@

- *www.epa.gov/iaq/radon*
- *www.epa.gov/iaq/radon/pubs*
- *www.nsc.org/ehc/radon.htm* (At this Web site you can find your state's radon information.).
- *www.radon.com*

The *International Residential Code* (IRC) addresses radon in Appendix F, Radon Control Methods. This appendix contains requirements for new construction in jurisdictions where radon-resistant construction is required.

Also in this appendix is a map of the United States illustrating the three different potential zones. In the pages following the map is a list of states and counties to further identify the area you live in.

If you are inspecting a house built after 2000, you should try to be aware of these construction codes and terms implemented into the 2000 IRC. If you are inspecting an older house, you might want to consult with a licensed real estate inspector.

Please see the glossary for some terms associated with radon gas in regard to housing construction.

Figure 4.1 on page 49 shows the United States map from the 2003 International Residential Code for One- And Two-Family Dwellings.

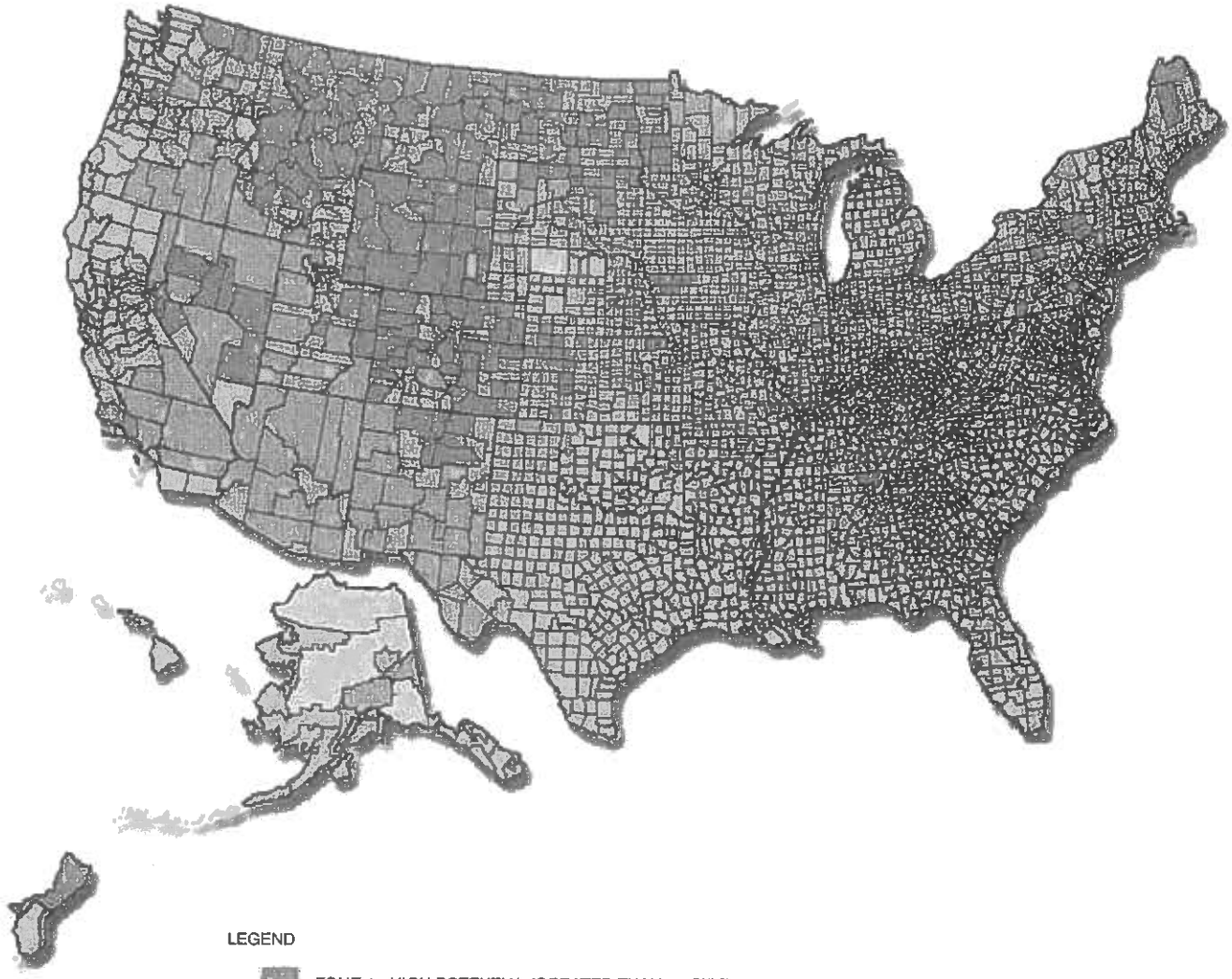
Underground Storage Tanks/Hazardous Waste

Pipes, usually 2 to 2½ inches in diameter, emerging from the ground that are capped or have a 180-degree bend at the top are Red Flags. Such pipes are common as vent pipes for underground fuel and solvent tanks.

Additional Red Flags related to underground storage tanks and hazardous waste include

- oil spots on the ground, or areas that are dark brown to black where vegetation will not grow;
- holes two or three inches in diameter in garage floors set so that fluids can flow into them (sumps are a pit or reservoir serving as a drain or receptacle for liquids);
- evidence of extensive paint or chemical storage facilities; or

Figure 4.1 | Map of Radon Zones



a. pCi/L standard for picocuries per liter of radon gas. EPA recommends that all homes that measure 4 pCi/L and greater be mitigated.

The United States Environmental Protection Agency and the United States Geological Survey have evaluated the radon potential in the United States and have developed a map of radon zones designed to assist building building officials in deciding whether radon-resistant features are applicable in new construction.

The map assigns each of the 3,141 counties in the United States to one of three zones based on radon potential. Each zone designation reflects the average short-term radon measurement that can be expected to be measured in a building without the implementation of radon control methods. The radon zone designation of highest priority is Zone 1. Table 1 of this appendix lists the Zone 1 counties illustrated on the map. More detailed information can be obtained from state-specific booklets (EPA-402-R-93-021 through 070) available through State Radon Offices or from U.S. EPA Regional Offices.

Source: *International Residential Code for One- and Two-Family Dwellings 2003.* Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.

- evidence of facilities or equipment indicating mechanical or fabrication work at that location.

Question the seller on past uses of the property. Was there a photographer who might have emptied photographic chemicals out back? Did someone run a home car repair or furniture refinishing business? Although it is not part of a visual inspection of the house, it is prudent to review title documents to see if the property is listed as having been used for something other than a residence.

Evidence of these Red Flags suggests that the conscientious broker or agent should ask whether there is an underground tank on the property. If there is, many states have regulations requiring the tanks' removal if they haven't been used in six months or a similar time period. Evidence of underground tanks can also trigger investigation into possible contamination. This potentially can lead to very expensive problems. *Whoever owns the property today must pay for the cleanup—even if they weren't responsible for the contamination.* As with the other hazardous wastes described in this chapter, a professional in this field must be hired to remove these tanks.

Lead Hazards from Pipes and Paint

What Is Lead Poisoning?

Lead poisoning occurs when the body contains a high concentration of lead. Lead poisoning can cause paralysis, brain damage, and convulsions.

Lead is regulated by the Environmental Protection Agency through the authority given to it in the Resource Conservation and Recovery Act (RCRA). The presence of lead in the water we drink or the paint used in a house is very dangerous. Children tend to absorb more lead than adults, and they are more likely to exhibit hand-to-mouth behavior.

Drinking Water

Drinking water can become contaminated as it passes through lead pipes. In the late 1930s lead water pipes were still being used. In 1986 the Safe Drinking Water Act required the use of lead-free solder, pipes, and flux for facilities connected to public water systems. Congress, in 1988, banned the use of lead-based solder in plumbing applications in houses and buildings.

Lead-Based Paint

The most probable places where lead-based paint will be found in a house are on the bathroom and kitchen walls, woodwork, and window frames. The use of lead paint was prohibited in 1980.

Although a visual inspection cannot determine whether a hazard exists, there are Red Flags that may indicate a thorough investigation is warranted. Checking for the presence of lead-based paint requires removing a sample and having it tested by a qualified laboratory.

The probability of lead-based paint having been used in a structure is directly related to its age. Studies have shown that lead-based paint was used in two-thirds of houses built prior to 1940 and one-third of houses built from 1940 to 1960. A smaller percentage of houses built between 1960 and 1980 were found to contain lead-based paint. You should be aware that commercial facilities in which

metal work, automobile radiator repairs, and soldering activities were carried out are also very likely places for lead contamination.

A Red Flag is related to the age of the house. HUD warns that three out of four houses built prior to 1978 have lead-based paint. Any house built before 1980 may contain lead-based paint. A rule of thumb is, "The older the house, the greater the possibility of lead-based paint."

case study — Case Study 1

Peter received a call from a couple who wanted him to list their property. Peter told them he would need to conduct a Red Flag inspection of the property and arranged to meet them that weekend. After their conversation Peter accessed the county's property records to learn as much as he could about this particular property before his inspection.

Peter arrived early Saturday morning and met with the Wilkinsons to go over the contract. Then Peter went over what a Red Flag inspection entailed. He inspected the inside of the house, documenting a couple of minor Red Flags. Finished inside, he started to inspect the exterior of the house and the surrounding property. Peter documented a few more Red Flags, and as he was walking the property he discovered about 12 dark, barren areas at the perimeter of the property. All of these areas were about two feet in diameter and there was no evidence of any buried tanks. There were no records of this being a commercial property in the past. Peter returned to the house and questioned the Wilkinsons to see what their knowledge of these barren spots was. They told Peter the spots were there when they purchased the property 25 years ago and they just never worried about them.

1. What should Peter do about these barren spots?
   a. Note them in the report and forget about them
   b. Consult with the previous owner if possible; if that is not possible, call the local hazardous waste specialist and ask for help
   c. Take samples of the barren spots and have a lab test them
   d. Tell the Wilkinsons to buy some sod and cover the barren areas

Discussion question: Whose responsibility or duty is it to investigate these barren spots? Peter's, the Wilkinsons, or someone else's?

case study Case Study 2

George and Gloria Martin are looking for an older house in the city so they will both be closer to their respective work locations. They decide to buy a quaint one-story house that was built in the early 1950s. Gloria's father tries to dissuade them from purchasing the house, as he tells them all of the houses built in that era were full of asbestos and lead. The Martins really want to purchase this home, but are worried what effects these materials will have on them and their children in the future.

The Martins finally decide to wait until they can find some help in making this purchase decision. They call their REALTOR® and ask her for help.

2. The REALTOR® should tell them to
   a. call the local hazardous materials professionals, write the EPA and ask for its literature on the material, consult with hazardous materials contractors in the area, and look on the Internet for further help.
   b. not worry about this, because the couple selling the house is not suffering from any ailments associated with these materials.
   c. buy the property and use latex paint to cover and seal all of these materials.
   d. look for a newly built property in the area instead.

Discussion question: As their agent, would you (a) recommend the Martins hire a general contractor so the contractor can eliminate all of the possible hazardous materials, (b) recommend they hire a contractor to raze the building and then build a new house, or (c) guide them to a newer house?

■ Review Questions

1. There are _____ of hazardous materials in a house.
   a. thousands
   b. millions
   c. hundreds
   d. dozens

2. How many different major classifications of hazardous materials are there?
   a. 5
   b. 4
   c. 6
   d. 3

3. In what year did the EPA and other government agencies ban the use of asbestos in building products?
   a. 1977
   b. 1970
   c. 1930
   d. 1950

4. To be a health risk, asbestos fibers must be released from the material and
   a. be present in the air for people to breathe.
   b. be ingested with liquid.
   c. come in contact with the skin.
   d. be subjected to ultraviolet light.

5. Asbestos has been used in products for four basic reasons. Which of the following is NOT one of the basic reasons for using asbestos?
   a. To strengthen the product material
   b. For decoration on exposed surfaces
   c. For fire protection
   d. For its color-enhancing properties

6. In your inspection of an older house you discover a decorative textured ceiling that is in good shape, but which you suspect contains asbestos. You should
   a. recommend that the homeowner scrape the texture off the ceiling before painting.
   b. recommend that the homeowner leave the texture alone.
   c. not mention you suspect the presence of asbestos.
   d. recommend that the homeowner paint the ceiling to hide the texture.

7. In older houses materials containing asbestos may be found in
   a. wood-burning stove insulation.
   b. furnace insulation.
   c. door gaskets in furnaces and wood stoves.
   d. All of the above

8. When making improvements or renovations on houses built between 1930 and 1950, the exposing and disturbance of asbestos is not an important consideration.
   a. True
   b. False

9. Some roofing shingles and siding shingles have been manufactured with asbestos using Portland cement as a binding agent. When present and in good condition on an older house, these product are likely to be of little risk to human health.
   a. True
   b. False

10. Radon gas comes from the natural breakdown of uranium. Radon gas has always been present in the air; however, radon gas is a health hazard when found in high concentrations. Such concentrations are usually found
    a. outside a house.
    b. inside a house.
    c. near the outside walls of a house.
    d. in the airspace immediately above a house.

11. Underground storage tanks can be containers for possible hazardous waste material. All of the following are Red Flags EXCEPT
    a. dark brown spots on the ground where vegetation will not grow.
    b. holes two or three inches in diameter in garage floors, set so fluids can flow into them.
    c. pipes, usually 2 to 2½ inches in diameter, emerging from the ground that are capped or have a 180-degree bend at the top.
    d. an abundantly producing vegetable garden.

12. Evidence of underground tanks can trigger investigation into possible contamination. This can lead to potentially very expensive problems. If contamination is found to exist, who pays for the cleanup?
    a. The previous owner
    b. The owner who is responsible for the contamination
    c. The present owner
    d. All owners share equally

13. If while conducting a listing inspection of a house you have any suspicions of the presence of hazardous waste material, the prudent action is to
    a. turn down the listing to avoid exposure to risk.
    b. say nothing to the homeowner.
    c. reveal your suspicions to the owner.
    d. reveal your suspicions and ask the owners of their knowledge of the past uses of the property.

14. Where is a soil-gas-retarder installed?
    a. Under the garage
    b. In the attic
    c. Around the bedrooms
    d. Between the soil and foundation

15. Black barren land is a sign of
    a. clay soil.
    b. silty soil.
    c. illegal dumping.
    d. a septic tank that has malfunctioned.

Chapter 1

Case Study 1

1. b. Spent more time explaining the importance of maintaining the soils around the house to prevent foundation damage because the expansive soils shrink and swell depending on the amount of rain in the area.

   Discussion question: The clients might have felt a little more at ease if given a copy of the Red Flag inspection, but it is never easy purchasing your first house. Or the Red Flag inspection report might make them more anxious, as the report would make them aware of items the buyer fixed before they viewed the house for the first time.

Case Study 2

2. c. Call a structural engineer and meet him at the house so he can perform a thorough inspection of the indentation and surrounding area

   Discussion question: Bill could volunteer to go back to the house, but Larry might think he is overstepping his authority. Or Bill could volunteer by telling Larry he has prior experience with landfill properties and he would like to help Larry learn more so he could become a more knowledgeable and better agent for their agency.

Review Questions

1. b
2. d
3. c
4. b
5. a
6. d
7. d
8. b
9. c
10. c
11. d
12. b
13. d
14. a
15. d

Chapter 2

Case Study 1

1. c. Go to the county records office and/or to the original builder and see if the house was built on landfill

   Discussion question: Bryan should have reviewed the listings as he pulled them and asked other agents or brokers in his office if he was not familiar with local area history on landfills. Or Bryan should have checked the county or city building permits to verify if the houses were built on fill soil.

Case Study 2

1. **c.** The access entry to the crawlspace is 18" × 24", the piers are made from many types of materials, the beams must rest on the pier, and water is never allowed under the house.

   Discussion question: Terri should have asked another agent who was familiar with pier-and-beam houses to ride along, so any questions the clients had would be answered. Or Terri should have explained to the clients that she was not familiar with pier-and-beam houses and asked them if it would be OK to bring in another agent who did have knowledge of this type of house.

Review Questions

1. **b**
2. **c**
3. **b**
4. **d**
5. **c**
6. **c**
7. **c**
8. **c**
9. **d**
10. **b**
11. **d**
12. **a**
13. **d**
14. **d**
15. **a**

Chapter 3

Case Study 1

1. **d.** an agent missing the concealed Red Flags.

   Discussion question: Depending on what time of the day Sharon conducted the inspection, how the lighting was hitting the walls, and at what angle Sharon was viewing the walls, more time may not have helped her because different lighting affects what she would see on a wall. Also, Sharon should always stand at an angle while she conducts her Red Flag inspections, as this will help her notice flaws in the walls that she would not see looking directly at the wall.

Case Study 2

1. **d.** All of the above

   Discussion question: The agent should ride along with an experienced agent and observe that agent during two or three Red flag Inspections. Also, the broker should compile a checklist of items an agent should check and provide this to all agents conducting Red Flag inspections.

Review Questions

1. b
2. c
3. c
4. a
5. d
6. d
7. b
8. d
9. c
10. c
11. d
12. b
13. d
14. b
15. d

Chapter 4

Case Study 1

1. **b.** Consult with the previous owner if possible; if that is not possible, call the local hazardous waste specialist and ask for help

   Discussion question: As the Wilkinsons' agent, Peter is responsible for finding out what caused these barren spots and then letting the Wilkinsons know so they can remedy this problem before their house goes on the market. Peter should advise the Wilkinsons to (a) hire a professional hazardous waste specialist or (b) call the local chapter of the EPA so the cause of these barren spots can be identified.

Case Study 2

1. **a.** call the local hazardous materials professionals, write the EPA and ask for its literature on the material, consult with hazardous materials contractors in the area, and look on the Internet for further help.

   Discussion question: You could try to persuade the Martins to do one of the recommended fixes, but as their agent you should have a long talk with them to find out what drew them to this specific house. Also, you could give them the names and numbers of companies that do the recommended work and then let the Martins decide what they really want to do.

Review Questions

1. c
2. b
3. a
4. a
5. d
6. b
7. d
8. b
9. a
10. b
11. d
12. c
13. d
14. d
15. c

asbestos A mineral fiber found in rocks. There are several kinds of asbestos fibers, all of which are fire-resistant and not easily destroyed or degraded by natural processes. Asbestos has been shown to cause cancer of the lung and stomach according to studies of workers and others exposed to asbestos. There is no level of exposure to asbestos fibers that experts can assure us is completely safe.

corner pops The corners of some foundations have a similar crack on both sides of the corner, or the corner may be missing altogether. These are called *corner pops* and are not a structural problem.

cracks with vertical slippage Foundation cracks with vertical slipping may be very serious. It means that the concrete on one side of the crack has moved down.

creep Movement caused when fills on the downhill edges of driveways, patios, and other slabs move down the hill and away from the house, taking any asphalt or concrete with them.

differential settlement The differential settlement of a house is the uneven downward movement of the foundation structure usually caused by varying soil or loading conditions. The results of this settlement are cracks and distortions of the foundation. This differential settlement creates pressure build-up, which concentrates at the corners of windows, rooms, doors, and at other places where structural members meet within walls.

efflorescence A whitish, powdery deposit of soluble salts carried to the surface of concrete, plaster, stone, brick, or mortar by moisture. Found mostly along foundations and walls, especially if there are also water stains. Efflorescence is an indication of repeated occurrences of moisture seepage in the basement or crawlspace.

expansive soils Soils composed mostly of clay. When exposed to water, expansive soils will absorb the water and swell; in dry conditions they shrink. This swelling and shrinking can exert great force and can easily move a relatively light structure such as a house. Expansive soils are usually black, dark brown, or dark red.

fill Soil that has been moved and placed artificially to fill low areas of a site.

frost line The depth to which frost penetrates the ground. The frost line depth varies from one part of the United States to another.

hairline cracks During the normal curing process of concrete, random hairline cracks will appear in the foundation. Hairline cracks are random thin cracks that look like pencil lines drawn on the surface, and they do not completely penetrate the surface.

horizontal cracks Horizontal cracking of concrete foundations is almost always accompanied by severe vertical cracking.

ionization smoke detector A smoke detector containing a small quantity of radioactive material in the sensing chamber that throws off a constant stream of radioactive particles, creating an electric charge in the chamber. When smoke enters the electrically charged chamber, it reduces the electric charge, thereby causing the alarm to sound.

lead poisoning Occurs when the body contains a high concentration of lead. Lead poisoning can cause paralysis, brain damage, and convulsions.

loam A mixture of two or more of the four classifications of soil, which are gravel, sand, silt, and clay.

open cracks The width of open cracks in the foundation should be estimated. If the open crack is wider than the lead in a No. 2 pencil or if one end of the crack is wider than the other, this usually indicates a foundation problem.

photoelectric smoke detector A smoke detector that contains a beam of light inside the sensing chamber. When the beam of light beam is deflected or broken, the alarm will sound.

pier-and-beam foundations Common in older homes built in areas with expanding soils. A pier is a vertical support that provides a bearing in the ground, functioning similar to a column. A beam is a horizontal structural member.

post-tension foundations Common in newer homes located in areas with expansive soils. Post-tension foundations have cables in the concrete that are slowly tightened over a period of days after the concrete has set. The ends of these cables must be covered; if they are not, it is a Red Flag.

radon gas A naturally occurring, chemically inert, radioactive gas that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock and can accumulate under the slabs and foundations of houses where it can easily enter into the living space through construction cracks and openings.

retaining walls Retaining walls are used to hold soil that would otherwise slide down. They are built of wood, rock, concrete, and so on. Most retaining walls should last 100 years or longer. A retaining wall is not supposed to move or crack.

riser The riser is the vertical member between two risers.

seismic strap A metal or fabric belt that holds an object such as a water heater erect in the event of an earthquake.

tempered glass Glass that is prestressed by heating and then rapidly cooled. This process makes the glass two to four times stronger than ordinary glass. Tempered glass will shatter into pebbles instead of breaking into slivers.

toxic waste Some wastes can be highly toxic and long-lived. Toxic substances can pollute water supplies that serve an entire community, pollute the ground a community is built on, or even contaminate food that is grown on polluted soils or irrigated with polluted water.

transpiration The removal of moisture by tree roots from under the foundation of a house.

tread The horizontal part of the stair. The tread is measured from the back to the front edge of the stair.